Appendix B

Consideration of Changes to the Yelloweye Rockfish Rebuilding Plan

Pacific Coast Groundfish Fishery 2019–20 Harvest Specifications, Yelloweye Rebuilding Plan Revisions, and Management Measures

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B.1 Executive Summary

In 2002, the National Marine Fisheries Service (NMFS) declared yelloweye rockfish to be overfished. At that time, the Pacific Fishery Management Council (Council) developed the rebuilding plan for the stock, including a default harvest control rule. The rebuilding plan has been updated several times, most recently in 2011. The Council has managed catch limits[1] over the past 16 years in order to rebuild the stock in the shortest amount of time possible, giving consideration to the biology of the species and the needs of fishing communities. The latest rebuilding analysis, completed in December 2017, indicated the stock is rebuilding 47 years faster than estimated in 2011[2]. The change in the median time to rebuild from 2074 (in the 2011 assessment) to 2027 (in the 2017 assessment) is due to several factors, including: lower than expected catches of yelloweye rockfish in recent years; a more optimistic value on stock recruit steepness, which corresponds to a more productive stock; and strong year classes entering the spawning population in recent years. Due to the estimated acceleration in the rebuilding progress of the stock, the annual catch limits (ACL) for yelloweye rockfish for 2019 and 2020 are expected to increase to 29 and 30 mt under No Action, respectively, as compared to the 2017 ACL of 20 mt. In response to the new stock status information, the Council analyzed a range of alternatives (Table B-1) and selected a preferred alternative (PA) that would decrease the current rebuilding plan spawning potential ratio (SPR) from 76 percent to 65 percent, and result in 48 and 49 mt ACLs[3].

Table B-1. Alternative 2019 and 2020 harvest specifications (mt) for yelloweye rockfish.

2018	**Alternative**	**2019**			**2020**			**HCR**
ACL		**OFL**	**ABC**	**ACL**	**OFL**	**ABC**	**ACL**	
20	No Action	81	74	29	84	77	30	ABC (P*=0.4), ACL (SPR=76%); median time to rebuild: 2027
	Alternative 1	81	74	39	84	77	40	ABC (P*=0.4), ACL (SPR=70%); median time to rebuild: 2028
	Alternative 2 *Preferred*	81	74	48	84	77	49	ABC (P*=0.4), ACL (SPR=65%); median time to rebuild: 2029

In 2019, Alternative 1 would increase the ACL by 10 mt, to 39 mt, relative to the No Action alternative (a 19 mt total increase from baseline to Alternative 1). Alternative 1 would provide a 3.0 percent increase of yelloweye rockfish yield over the rebuilding timeframe when compared to No Action and would add one year (2028) to the median time to rebuild. Alternative 2 would increase the ACL by 19 mt, to 48 mt in 2019, relative to the No Action alternative (a 28 mt total increase from baseline to Alternative 2). Alternative 2 would provide a cumulative 8.4 percent more yelloweye rockfish over the rebuilding timeframe when compared to No Action and would add two years to the median time to rebuild (2029).

[1] Presently "annual catch limits" (ACLs), formerly "optimal yields" (OYs).

[2] The most recent stock assessment has the stock at 28.4 percent depletion with a T_{TARGET} of 2027 under the current rebuilding plan. The prior T_{TARGET} of 2074 had been in place since 2011.

[3] Council identified PA in June 2018. Note that under the requirements for rebuilding plans in the Magnuson–Stevens Act, NMFS is not required to revise a stock's rebuilding plan unless that stock is not making adequate progress towards rebuilding.

The Magnuson-Stevens Fisheries Conservation and Management Act (MSA) states that any new rebuilding plan must select a target time for rebuilding (T_{TARGET}) that is "as short as possible," while giving consideration to "the status and biology of the overfished species and the needs of the fishing communities" (MSA Section 303(e)(4)).[4] This consideration of community needs in rebuilding plans was intended to provide managers "some leeway to avoid disastrous short-term consequences for fishing communities."[5]

Under the requirements for rebuilding plans in the MSA, NMFS is not required to revise a stock's rebuilding plan unless that stock is not making adequate progress towards rebuilding. However, NMFS may revise such plans in response changing circumstances or new information. Yelloweye rockfish catches are rare and unpredictable, making projections uncertain, requiring management measures to be conservative, and creating an atmosphere of avoidance among industry. Yelloweye rockfish therefore continue to be underutilized coastwide and limit access to target species in different sectors each year. The Council indicated a new default harvest control rule may more appropriately account for the needs of West Coast communities by providing greater opportunity in both commercial and recreational groundfish sectors, improving income stability for dependent communities, and avoiding additional short-term disastrous consequences. This analysis assesses whether circumstances have changed since the last rebuilding plan revision in 2011 to the extent that the current rebuilding plan no longer supports the needs of communities.

B.1.1 Needs of Communities Following the 2011 Revision

West Coast fishing communities depend on a portfolio of commercial and recreational fisheries to support year-round operations. Throughout the mid-2000s and, notably during the 2009 to 2011 Council reconsideration of the yelloweye rockfish rebuilding plan, coastwide opportunities remained relatively strong for key fisheries including Dungeness crab, salmon, coastal pelagic species (CPS), highly migratory species (HMS), pink shrimp, and other non-groundfish fisheries. However, in the following years through the present, changing environmental conditions (e.g., 2011 tsunami, 2013–15 warm water "blob"); conservation challenges (e.g., additional listing of salmon stocks, directed sardine fishery closure); and changes in management (e.g., 2012 California implementation of 20 Marine Protected Areas, covering about 13 percent of the area north of 40°10' N lat.) impacted coastwide commercial landings. These changes contributed to a 23 percent decline in landings of Dungeness crab,[6] a 44 percent decline in salmon landings, a 64 percent decline in CPS landings, a 10 percent decline in HMS landings, a 12 percent decline in pink shrimp landings, and a 26 percent decline in other non-groundfish species landings[7] from 2015–17 relative to the 2011–14 average annual landings. Recreational fisheries showed a similar downward trend during the 2015 to 2017 period, with 34 percent fewer HMS angler trips and 77 percent fewer salmon trips in 2015–17 relative to 2011–14. Notably, average West Coast income impacts associated with commercial and recreational ocean salmon fisheries in 2016–17 for Washington, Oregon,

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[4] National Standard 8 under the MSA further elaborates on consideration of community needs by stating that, "conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to (A) provide for the sustained participation of such communities, and (B) to the extent practicable, minimize adverse economic impacts on such communities" (National Standard 8 (MSA Section 301(a)(8))).

[5] For a more detailed discussion of rebuilding plan requirements, see Agenda Item H7a Supplemental NMFS Report 2.

[6] Declines in average crab landings were almost entirely due to the domoic acid closures in 2015.

[7] "Other" comprised largely urchins, hagfish, Pacific halibut, and sea cucumbers.

and California (combined) were an estimated $50 million, 51 percent below the 2012–15 inflation-adjusted average of $102.8 million (2016 Salmon SAFE).

West Coast groundfish is often described as "the glue that holds fishing communities together."[8] Groundfish provides recreational and commercial opportunities that have historically balanced seasonal opportunities and boom and bust cycles typical of salmon, CPS, and crab. From the early 2000s to the present, restrictions in catch of target species due to rebuilding groundfish stocks in both commercial and recreational sectors have left West Coast, portfolio dependent fishing communities increasingly vulnerable to environmental and conservation challenges (e.g., El Nino, salmon ESA listings, etc.) observed from 2015 to 2017. Over this recent period, non-groundfish portfolio losses have put increased pressure on rebuilding groundfish fisheries, particularly in the recreational sector, which is highly dependent on salmon and HMS opportunities that are currently diminished. This recreational trend is apparent in Figure B-1, where average annual bottomfish trips increased about 30 percent in 2015–17 relative to 2010–14.

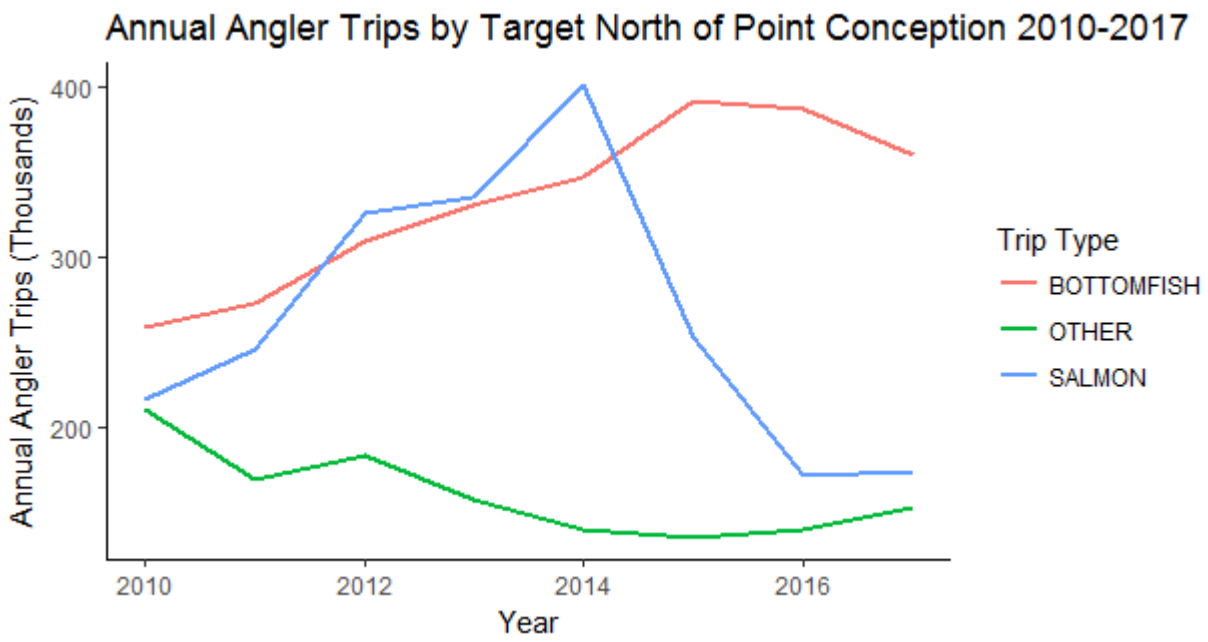

Figure B-1. Recreational effort by target from 2010–17. Source: RecFIN.

Bottomfish trips (red line in Figure B-1) were subject to unanticipated inseason management restrictions in Oregon (2016/2017) and California (2017), indicating the sector could not absorb displaced salmon effort under the baseline yelloweye rockfish harvest guidelines (HGs). For instance, there has been a decline of over 200,000 salmon trips per year from 2014–current, but only a 40,000 increase in bottomfish trips resulting in an overall loss of over 160,000 trips. The recreational bottomfish fisheries are unable to absorb more salmon loss since they have been confined to shallow depths to minimize impacts to deeper yelloweye rockfish, which in the process has resulted in near full attainments of shallow water target stocks. Oregon, for example, had to close its entire shallow water bottomfish fishery in September 2017 due to exceeding the ACLs of Oregon black rockfish and cabezon, which are two of the main shallow water stocks. Higher yelloweye rockfish allocations could allow more new trips in deeper waters

[8] See, for example, SSC Econ Subcommittee Minutes March 2000, Agenda Item H.2.d Public Comment March 2011.

where target stocks are underutilized, help offset salmon loss via new substitute opportunity, and ultimately prevent further losses of total trips which drive community benefits.

These effort shifts, combined with unpredictable ocean conditions and limited catch information for yelloweye rockfish due to non-retention and rare high catch events, generate uncertainty in catch projections. For example, in the nearshore fishery, yelloweye rockfish catch can vary by 2-3 times in magnitude across years. This uncertainty engenders a conservative management approach, low commercial attainment of co-mingled target species, and a number of inseason restrictions and closures that have disrupted fishing communities, particularly recreationally dependent communities, including Neah Bay, WA; Winchester Bay, OR; and Fort Bragg, CA. Many recreational communities have high unemployment and a larger share of residents in tourism sectors largely dependent on recreational fishing opportunities, making them particularly vulnerable to resource fluctuations and the associated management response.

B.1.2 Impacts of the Alternatives

Over years of public comment, stakeholders have emphasized the need for stability at the individual operator/angler and community level. This priority is reflected in a number of Pacific Coast Groundfish Fishery Management Plan (FMP) goals and objectives: promoting the year-round availability of quality seafood; keeping fisheries diverse, stable, and profitable; extending marketing and fishing opportunities as long as practicable during the fishing year; consideration of the importance of groundfish resources to fishing communities to provide for the sustained participation of those communities; and minimizing adverse economic impacts on fishing communities to the extent practicable.

The Council's consideration of the three alternatives provides the opportunity for a range of management measures to increase access to target species while providing stability to these dependent and vulnerable communities. Alternatives 1 and 2 provide additional fishing opportunity while increasing the time to rebuild by one and two years, respectively, assuming the entire ACL is harvested. As will be discussed throughout this document, the action alternatives will provide managers with sufficient buffers to consider management measure adjustments that increased access to target species while minimizing bycatch and being precautionary due to uncertainty in potential yelloweye rockfish catch. The buffers referred to in this document include the difference between the projected catch by sector and the sector allocation (HG or share) and the sum of those buffers, which is the difference between the total projected mortality and the ACL (sometimes referred to as the "balance in the scorecard").

B.1.2.1 Short term Community Impacts (2019–20 Biennium)

For the 2019–20 biennium, the level of impact of the alternatives varies by sector and community. While all recreational sectors will see an increase in benefits across all of the alternatives, some of the commercial sectors will see little to no change even under Alternative 2 given the management measures the Council selected under the preferred alternative for the next two years.[9] The degree to which additional opportunities can be provided for each sector will depend on the buffer between projected

[9] Note that some of these short term impacts from changes to management measures were incorporated into traditional specification modeling exercises, with results explained in Appendix A, and subsequent economic impacts quantified in Chapter 4, Tables 4-5 through 4-20 (Agenda Item F.2 Attachment 1; April 2018). Given the lack of historic data to use in projections, a majority of these impacts are not informative of the difference between any of the alternatives relative to yelloweye rockfish (as explained in detail in the analysis and summarized in the "Shorebased IFQ Impacts" discussion below).

mortality and the allocations under each alternative. Further, a buffer at the ACL level provides greater certainty that if a sector (or sectors) exceeds the allocation(s), the ACL will not be exceeded. Under Alternative 1 and 2, there is additional allocation for each sector to provide stability to their constituents as yelloweye rockfish bycatch is uncertain.

The tables below describe the impacts by alternative for each sector in 2019–20. For recreational communities, there are a number of opportunities to reduce depth restrictions that can drive additional fishing effort to recreational communities. In addition, it is expected that the redistribution of fishing effort into deeper depths will allow access to a broader suite of species (e.g., yellowtail rockfish, lingcod, and chilipepper rockfish). This could reduce pressure on nearshore stocks and provide additional options to address competing and conflicting management needs (i.e., minimize impacts on black rockfish without increasing encounters with yelloweye rockfish).

For commercial trawl communities, the risk avoidance that drives low attainment of high value species like lingcod, chilipepper rockfish, and Pacific cod appears likely to persist under No Action. With the large number of uncaught yelloweye rockfish quota pounds each year, it is unlikely the increased availability of quota pounds under No Action relative to the 2017 baseline will significantly increase usage or trading. However, the increase in the annual vessel limit under Alternative 1 and 2 may provide a buffer against the estimated risk of exceeding a limit and subsequent financial consequences. This concept is of particular importance for fishermen who plan to access the areas within the trawl Rockfish Conservation Area (RCA) off California and Oregon that the Council recommended for reopening in Amendment 28 to the FMP. Increased attainment of underutilized species in commercial sectors is likely to lead to increased employment and revenue for both harvesters and fishery support sectors (processors, ice plant, net vendors, etc.), better meeting community needs for portfolio fishing options and stability in the next biennium.

For the fixed gear sectors (described in greater detail in the fixed gear section below), broad non-trawl RCA closures and low trip limits of underutilized target stocks have been necessary to keep bycatch of yelloweye rockfish within low allocations. These bycatch constraints have resulted in less than 10 percent attainment of the northern lingcod and mid-water rockfish allocations (i.e., canary, widow, and yellowtail rockfishes) since 2015, with the potential benefits of the uncaught quota being worth an estimated $20.6 million in ex-vessel revenue, $35.6 million in income, and 2,205 jobs. No Action does not provide sufficient allocations to consider much, if any, re-openings to the non-trawl RCA and only provides modest ability to increase trip limits in the 2019–20 biennium or during rebuilding. However, Alternatives 1 and 2 would provide a pathway for the Council to consider higher trip limits and changes to the non-trawl RCA outside of the 2019–20 cycle as only modest increases to northern trip limits were proposed for 2019–20 (still <10 percent attainment) and because the proposal to reopen portion of the non-trawl RCA off northern California was not included in the preferred alternative (discussed in more detail below). The perceived benefits therefore appear low for fixed gear in the short-term for all alternatives (Preliminary Draft Environmental Assessment, April 2018) since they are only based on the suite of management measures considered for the 2019–20 cycle.

No Action: The SPR remains at the current rate of 76 percent, and the 2019–20 ACLs increase by 9 and 10 mt, respectively, over the 2018 ACL, due to increases in the projected biomass. The yelloweye rockfish ACL ranges from an estimated 31 mt in 2021 to 109 mt from 2027 (median time to rebuild) onward. With this increase, the Council could consider minor changes to management measures relative to the baseline to expand fishing opportunities while minimizing catch of non-target stocks, including:

Sector	No Action Impacts
At-Sea	• No impacts.
IFQ	• Median catch share quota share owner receives an additional six pounds of yelloweye rockfish quota compared to the 2017 baseline, or 14 pounds total (about five observed-average sized-fish) • Yelloweye rockfish catch increase by 37 percent
Non-Nearshore	• No data or allocations to support changes to non-trawl RCA • Modest increase in trip limits to lingcod north of 40º 10' N lat.
Nearshore	CA: • Trip limits would remain status quo (2017 baseline) but could accommodate minor increases in landings from new entrants. New effort could lead to unanticipated yelloweye impacts which would prevent full attainment of state landing targets, nor modifications to the non-trawl RCA, north or south of 40º 10' N lat. OR: • No data or allocations to support changes to non-trawl RCA • Modest increase in trip limits to lingcod north of 40º 10' N lat.
Tribal	No additional buffer against tribal set aside, would not enable increased opportunities for lingcod directed fisheries. Tribal communities involved with Washington (WA) recreational fisheries would benefit as described below.
WA Rec	North Coast • Delay implementation of the 20 fm depth restriction currently in place from May through September under Baseline by three weeks. • Fishing in the C-Shaped yelloweye rockfish conservation area (YRCA) would continue to be prohibited during the entire season South Coast • Delay implementation of 30 fm line by one month, lingcod prohibited (2017 baseline is prohibition of all non-rockfish groundfish). • Season-long deep water lingcod closure ~40 fm (lingcod retention only during halibut fishery) remains in place. • Fishing in the Westport YRCA and the Offshore YRCA would continue to be prohibited during the entire season. Columbia River • No retention of groundfish allowed with halibut on board, with some exceptions on days halibut is open, in the WA portion of the Columbia River area. Coastwide • Fishing would continue to be closed from mid-October through mid- March. • Management measure changes are not significant enough to project an increase in angler trips compared to baseline measures. • Buffer of 0.3 mt between projected impacts and the WA HG
OR Rec	• Allow seasonal depth restriction in state regulations to move back to 40 fm, the same as in federal regulations. • Reduce the months with depth restrictions by 2 (April and September), which could increase angler trips by providing additional opportunity to access deep water lingcod. • Would take some pressure off of more nearshore species and reduce chances of early closure due to attainment allocations of those species.

Sector	No Action Impacts
CA Rec	• All-depth access in November and December can be provided in Northern and Mendocino management Areas.

Alternative 1: Decrease the SPR scaled exploitation rate to 70 percent from the current rate of 76 percent. This increases 2019–20 ACLs by 9 mt and 10 mt above ACLs under the current rebuilding plan, and 19 mt and 20 mt above the 2018 ACL. Future ACLs are predicted to range from 40.9 mt in 2021 to 109 mt in 2028 onward (the projected median time to rebuild, one year longer than under the No Action Alternative). With this increase, the Council could adopt some additional modifications to management measures that increase fishing opportunity resulting in higher landings and angler trips, compared to No Action.

Sector	Alternative 1 Impacts
At-Sea	• No impacts.
IFQ	• Median catch share quota share owner receives an additional five pounds of yelloweye rockfish quota compared to No Action: 19 pounds total (about 7 observed average sized fish). • Lack of data to inform projections about increases to target species, but utilization expected to increase with availability of bycatch quota pounds relative to No Action.
Non-Nearshore	• No proposals in PPA to reopen non-trawl RCA • Modest increase in trip limits to lingcod north of 40º 10’ N lat.
Nearshore	CA: • Trip limits would remain the same as 2017 baseline but could accommodate increases in landings from new entrants and full attainment of state landing targets or modifications to the non-trawl RCA, north or south of 40º 10’ N lat. OR: • No proposals in PPA to reopen non-trawl RCA • Modest increase in trip limits to lingcod north of 40º 10’ N lat.
Tribal	• Buffer against tribal set aside to enable increased opportunities for lingcod-directed fisheries. The tribal communities involved with WA recreational fisheries would benefit as described below.

Sector	Alternative 1 Impacts
WA Rec	North Coast • Delay implementation of the 20 fm depth restriction currently in place from May through September under Baseline by three weeks. • Retention of yellowtail rockfish and midwater rockfish would be allowed seaward of 20 fm in July and August. • Fishing in the C-Shaped YRCA would continue to be prohibited during the entire season. South Coast • Delay implementation of 30 fm line by one month, only lingcod remain prohibited (2017 baseline is prohibition of all non-rockfish groundfish). • Allow fishing in the deep water lingcod closed area for two weeks in June and two weeks in September. • Fishing in the Westport YRCA and the Offshore YRCA would continue to be prohibited during the entire season. Columbia River • No retention of groundfish allowed with halibut on board, with some exceptions on days the recreational halibut fishery is open, in the WA portion of the Columbia River area. Coastwide • Fishing would continue to be closed from mid-October through mid- March. • Angler trips are expected to increase by 217 under Alternative 1 compared to No Action • Alternative 1 provides a buffer of 2.86 mt between projected impacts and the WA HG.
OR Rec	• Seasonal depth restriction would be able to be eliminated; however, to be precautionary, depth restrictions may be kept in place through state rules for June, July, and August. o If projected impacts are within quotas, the number of months with depth restrictions could be eliminated inseason or in the second year of the biennium. • The daily bag limit in state regulations (2 fish per day) for lingcod would be able to be increased to match the federal limit (3). This would reduce pressure on more nearshore species and further decrease the chance of an early closure due to attainment of these species' allocations.
CA Rec	• The fishery is proposed to be open year-round at all depths in all areas statewide.

Alternative 2 (Preferred Alternative): Change the SPR harvest rate to 65 percent. This increases the 2019 ACL by 18 mt and the 2020 ACL by 19 mt above ACLs under the current rebuilding plan, and 28 mt and 29 mt, respectively, above the 2018 ACL. Future ACLs range from 50 mt in 2021 to 109 mt in 2029 onward (the projected median time to rebuild extends one year beyond Alternative 1, and two years beyond No Action). With this increase, the Council could adopt some additional modifications to management measures that increase fishing opportunities resulting in higher landings and angler trips, compared to both No Action and Alternative 1, including:

Sector	Alternative 2 Impacts
At-Sea	• No impacts.

Sector	Alternative 2 Impacts
IFQ	• Median catch share quota share owner receives an additional five pounds of yelloweye rockfish quota compared to Alternative 1 (24 pounds total, about 9 observed-average sized-fish) • Lack of data to inform projections about increases to target species, but utilization expected to increase with availability of bycatch quota pounds relative to No Action and Alternative 1.
Non-Nearshore	• No proposals in PPA to reopen non-trawl RCA • Modest increase in trip limits to lingcod north of 40º 10' N lat.
Nearshore	CA: • Trip limits would remain status quo (2017 baseline) but could accommodate increases in landings from new entrants and full attainment of state landing targets or modifications to the non-trawl RCA, north or south of 40º 10' N lat. OR: • No proposals in PPA to reopen non-trawl RCA • Modest increase in trip limits to lingcod north of 40º 10' N lat.
Tribal	• Buffer against tribal set aside to enable increased opportunities for lingcod-directed fisheries. The tribal communities involved with WA recreational fisheries would benefit as described below.
WA Rec	Coastwide • Washington recreational fisheries would be open at all depths during the open season. • Fishing would continue to be closed from mid-October through mid- March. • Fishing in the C-Shaped YRCA, the Westport YRCA, and the Offshore YRCA would continue to be prohibited during the entire season. • Reducing the time and depth restrictions in place is directly tied to access to more yelloweye rockfish; angler trips and are projected to increase by 2,698 under Alternative 2 compared to No Action. • No buffer between the projected catch of 10.3 mt and the 10 mt WA HG under Alternative 2.
OR Rec	• Seasonal depth restrictions would be eliminated, and the fishery would be all-depth year round. • The lingcod daily bag limit in state regulations (2 fish per day) for lingcod would be able to be liberalized to match the federal limit (3). • Limitations on groundfish retention during all-depth Pacific halibut fishing could be eased. • This would further take pressure off of the more nearshore species and further decrease the chance of an early closure due to attainment of allocations for those species. • This would allow for bottomfish fishing out of some ports (e.g., Winchester Bay) that have been effectively prohibited from groundfish fishing since the depth restrictions went into place.
CA Rec	• The fishery is proposed to be open year-round at all depths in all areas statewide.

B.1.2.2 Long Term Community Impacts

Long term benefits to communities under Alternatives 1 and 2 are expected to include substantial revenue and employment benefits for fishing communities involved in all sectors of the groundfish fishery compared to No Action. With the extra one to two years of rebuilding time, these DHCRs would continue to provide additional opportunities for West Coast communities while buffering for uncertainty in catch projections.

Stability at the sector level through management buffers, summarized for the 2019–20 biennium above, would be expected to extend through future bienniums. Even with more than 15 years of fishery experience avoiding yelloweye rockfish catch while this stock has been in a rebuilding program, mortality has varied significantly in some sectors. Because of the variability in yelloweye rockfish catch across sectors, stakeholders and the Council have been reluctant to propose management measures that could potentially increase attainment of co-occurring target stocks because these measures could also decrease stability for fishing operations by increasing the potential for disruptive inseason closures.

The largest benefits to communities would likely come from future management changes beyond the 2019–20 biennium, such as non-trawl RCA adjustments, which would be feasible under Alternative 1 or Alternative 2 ACLs, but not under No Action allocations. Thus, the No Action ACLs may not provide the opportunities to fully access underutilized stocks such as lingcod and midwater rockfish, which are projected to bring $20.6 million in ex-vessel revenue, $43.6 million in income, and 2,300 jobs from non-trawl commercial sectors alone. However, the potential benefits in the longer-term with Alternatives 1 and 2 could result in additional tens-of-millions in revenues and wages and thousands of jobs for the fixed gear sectors if re-openings of the non-trawl RCA and higher trip limits were considered in the future. Though they are difficult to project, the ACL changes would likely also lead to revenue increases in the trawl and recreational fisheries.

A secondary benefit to communities would be expanded opportunities for innovation via research and exempted fishing permits (EFPs). Research by the scientific community would improve accuracy of stock assessments, increase understanding of species dynamics, and aid in the management. Further, EFPs would provide industry with additional opportunities to explore new methods for fishing.

B.1.2.3 Impacts of the Alternatives on the Stock

The 2017 yelloweye rockfish stock assessment showed that the stock was 47 years closer to rebuilding than indicated in the 2011 assessment; however, with all other factors remaining the same, increasing fishery removals can decrease spawning stock biomass and increase rebuilding time. In this instance, the differences in projected rebuilding times among levels of fishery removals for alternatives considered by the Council are small, with the additional yield under Alternatives 1 and 2 adding one and two years respectively to the median time to rebuild within the next ten years. Projected resilience of the stock to fishery removals is the result of a series of strong year classes joining the spawning population, as the Scientific and Statistical Committee (SSC) wrote in its November 2017 statement.

B.1.3 Conclusion

The analysis of the yelloweye rockfish rebuilding plan suggests the 2011 rebuilding plan may no longer be adequate to meet the needs of fishing communities. National Standard 8 (NS8) requires consideration of impacts of regulatory action on fishing communities. However, the MSA requires that overfished stocks be rebuilt “in the shortest time possible.” The yelloweye rockfish rebuilding plan, including the revision considered here, is driven by the mandates of the MSA and National Standard 1 (NS1) to rebuild

the yelloweye rockfish stock within a limited time frame. No directed fishing by non-treaty groundfish vessels would rebuild the stock in the shortest amount of time, but this was not considered by Council, as it conflicts with the MSA mandates to consider communities' needs. No Action, Alternative 1, and Alternative 2 vary by the degree to community opportunities are provided while also rebuilding the stock in less than 10 years (between 2027 and 2029).

No Action provides an increase in yelloweye rockfish over the 2017 Baseline, which would provide some opportunities to communities, such as fewer recreational depth restrictions and more QP on the IFQ market to better facilitate trading. Alternative 1 provides an expansion of the increased opportunity possible under No Action through the management measures outlined above. This addition over No Action would likely benefit the recreational sector in particular, as effort continues to shift away from salmon trips to lingcod and rockfish targeting substitutes. The highest-impact benefits may be the most difficult to quantify; for example, the creation of a cushion between management measures and catch limits may increase management stability by an undefined amount. Projections from limited available data do not indicate that Alternative 2 is expected to provide a significant increase in angler trips or landings, particularly in regards to non-yelloweye rockfish constraints on fishing effort. Discernible additional benefits provided by Alternative 2 would be the larger cushion from which to increase set asides for research and experimental fishing in commercial, recreational, and tribal sectors. Data from these projects would have indispensable value to improve understanding of the stock and to inform state, federal, and tribal management decisions.

B.2 Management of Yelloweye Rockfish

B.2.1 History of the Rebuilding Plan

Yelloweye rockfish was declared overfished in 2002, based on the results of the first assessment conducted for the stock in 2001 (Wallace 2002). The Council adopted a rebuilding plan for yelloweye rockfish in April 2004[10] (Appendix H to Amendment 16-3). The rebuilding plan was revised in 2007 under Amendment 16-4 to the FMP. The 2007 rebuilding plan specified a harvest rate ramp-down strategy with annual decreases in the harvest rate to a constant level.[11] Initially, the Council recommended an SPR of 66.3 percent in the 2009–10 biennium, which resulted in an ACL of 17 mt. However, in April 2010, the U.S. District Court of Northern California (Court) issued a Summary Judgment and Order in a long-running case that remanded and vacated the 2009–10 harvest specifications ("OYs") for seven overfished groundfish species, including yelloweye rockfish, and directed NMFS to establish new specifications within one year. The Court determined that NMFS had not demonstrated that the ACL of 17 mt for yelloweye rockfish, which would have delayed the time to rebuild by 10 years, was necessary to meet the needs of fishing communities. The district court enjoined the Agency and ordered it to implement an ACL of 14 mt.

When the Council recommended an ACL of 20 mt for yelloweye rockfish in 2011–12, NMFS concluded that the recommendation was not consistent with the Court's guidance. NMFS subsequently disapproved the Council's preferred rebuilding alternative (Amendment 16-5) and instead selected the NMFS preferred alternative, which was enacted as Secretarial Amendment 1.[12] NMFS established an ACL of 17 mt, explaining that it "results in a timeline that is as short as possible because this ACL results in rebuilding 10 years sooner than the Council's FPA (2074 vs. 2084) without appreciable increased impacts to fishing communities compared to the Council's FPA." This rebuilding plan, with an SPR of 76

[10] The 2004 rebuilding plan specified a target rebuilding year (T_{TARGET}) of 2058 and an HCR of F = 0.0153.
[11] The rebuilding plan was revised in 2007 under Amendment 16-4 with a T_{TARGET} of 2084 and an HCR specifying an initial SPR harvest rate of 55.4 percent, ramping up to SPR = 71.9 percent starting in 2011.
[12] Setting the rebuilding HCR for yelloweye rockfish to an SPR of 76.0 percent and a T_{TARGET} of 2074.

percent, was implemented in 2011 and has remained in place through the most recent biennium (2017–18).[13]

When yelloweye rockfish was declared overfished in 2002, the Council began implementing a series of management measures focused on limiting access to yelloweye rockfish habitat and overall mortality (Appendix 1). These included prohibited retention in recreational fisheries beginning in 2002, reduction in commercial bi-monthly retention limits, implementation of broad spatial closures (a trawl Rockfish Conservation Area [RCA] in September 2002 and a coastwide non-trawl RCA in 2003), depth restrictions in recreational fisheries in 2003, yelloweye rockfish conservation areas (YRCAs) for both recreational and commercial fisheries in 2003, and creation of new gear restrictions intended to reduce trawling on rocky shelf habitats and bycatch of rockfish in shelf flatfish trawls (Appendix 1). In addition, the trawl and non-trawl commercial fisheries have had RCAs that vary by latitude, month, and year (Appendix 2 for trawl; Appendix 3 for non-trawl).

While the broad-scale management measures have changed little in recent years, industry has improved its awareness and responsiveness. The commercial fleets actively avoid yelloweye rockfish in areas open to fishing (e.g., the shelf), avoid hotspots through both formal and informal information-sharing risk cooperatives, and fish at night when yelloweye rockfish catch is lower. In recreational fisheries, in areas not already closed, anglers are encouraged by managers to avoid areas of known yelloweye rockfish habitat or encounters, and, when yelloweye rockfish are encountered, are encouraged to use descending devices to release the fish back to depth to decrease the discard mortality rate.[14]

Yet, even with more than 15 years of fishermen's experience in mitigating yelloweye rockfish bycatch, mortality has varied significantly in some sectors (Table B-2). Stakeholders and the Council have been reluctant to propose more liberal management measures that could potentially increase attainment of co-occurring target stocks due to concerns that these could decrease stability for fishing operations and increase the potential for disruptive inseason closures. This variability in bycatch of yelloweye rockfish is due to a number of factors, including unpredictable ocean conditions; effort shifts to target fisheries that have higher bycatch rates of yelloweye rockfish; and rare, unforeseen encounters outside of known yelloweye rockfish hotspots. For commercial sectors, most sets or hauls contain little to no yelloweye rockfish, but each sector occasionally has high bycatch events, as shown in the long tails in Figure B-2 below, leading to uncertainty about annual catches and concerns about "lightning strikes" (unexpected high bycatch events).

This uncertainty also holds true for recreational fisheries. As an example, shown in Table B-3 below, actual mortality in the Washington recreational fishery has ranged from 62 to 125 percent of the projected mortality over the past 11 years. Yet, the management measures over this time period varied little. As discussed below, the potential fishing opportunities being considered for 2019–20 could provide access to areas that have not been fished extensively (or at all) in over 15 years. Therefore, there may be unanticipated impacts from opening these areas that makes projections of yelloweye rockfish so uncertain. Even though each of the groundfish projection models have been reviewed by the SSC since 2011 to improve estimates of bycatch, there is still a considerable amount of variation and uncertainty in pre-season projections and modeling compared to actual mortality.

[13] See the current and historical SAFE documents and well as current stock assessment for more information.
[14] Beginning in 2017, the use of descending devices became mandatory in the Oregon and Washington recreational fisheries.

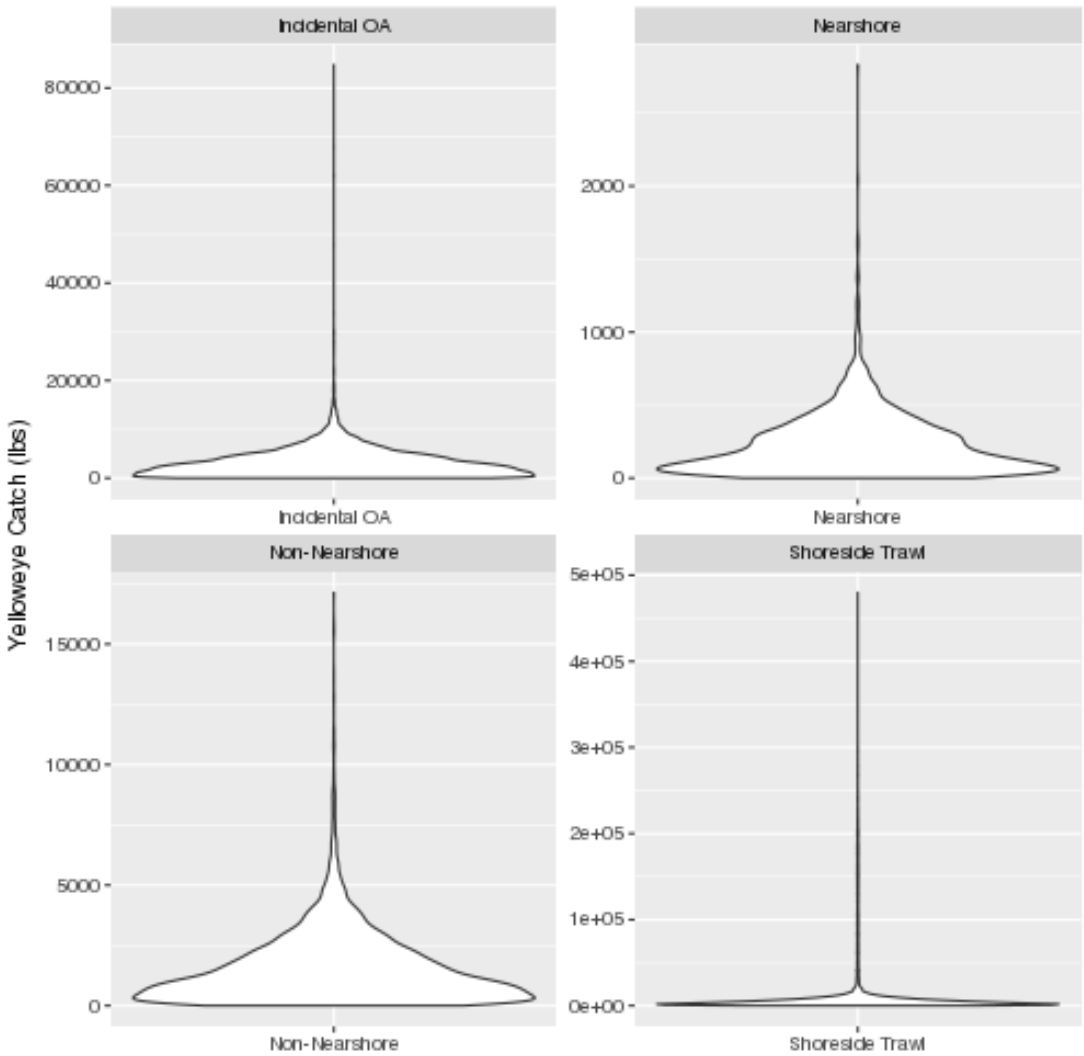

Figure B-2. Violin plot of the variability in observed yelloweye catch (lbs.) by sector from 2012 to 2016. The y-axis represents the range of all observed catch, and the width along the x-axis represents how common the observed level was, thus the thickest section represents the most common level of catch (mode). These plots show the distribution of haul/set catch of yelloweye rockfish across the fishery sectors, with most catch events with no or low levels of yelloweye rockfish, and a wide range of higher-catch events in each sector.

Table B-2. Yearly yelloweye rockfish mortality (in mt) by sector, 2007–16. Data from the West Coast Groundfish Observer Program (WCGOP) annual mortality reports. Values have the same number of significant digits as the report for that year.

Sector	Res.	I- OA	Tribal	Shoreside Trawl a/	Non-Near-shore	Near-shore	WA Rec	OR Rec	CA Rec	Total Mort.	ACL/ OY (mt)	Mortality % of ACL	Inseason actions
2007	2	0	0	0	1	3	2	3	8	19	23	82.60%	*CA rec north of Pigeon Point closed Oct. 1
2008	1	0	0	0	1	2	2	3	2	11	20	55.00%	*OR rec fishery restricted to inside 20 fm, bag limit reduced July 7–Sept 7
2009	0.7	0.4	0.3	0.1	1.3	0.5	1.6	2	3.8	10.7	17	62.90%	
2010	0.5	0	0.4	0.1	0.3	0.1	2	2.8	1.3	7.5	14	53.60%	*OR rec fishery restricted to inside 20 fm July 24–Dec 31
2011	0.84	0.29	0.06	0.06	0.3	0.76	2.35	2.1	2.09	8.85	17	52.10%	*OR rec fishery restricted to inside 20 fm July 21–Sept 30
2012	1.25	0.09	0.15	0.03	0.34	1.79	3.22	3.08	1.61	11.56	17	68.00%	*WA rec fishery closed in the north coast management area (marine areas 3 and 4) after Labor Day due to attainment of WA yelloweye HG.
2013	0.93	0.1	0.35	0.06	0.27	2.71	2.08	2.72	1.47	10.69	18	59.40%	
2014	0.31	0.35	0.38	0.09	0.48	0.96	2.84	2.63	1.06	9.1	18	50.60%	
2015	0.56	0	0.64	0.03	0.76	1.82	2.51	3.25	1.66	11.23	18	62.40%	
2016	0.89	0	0.19	0.04	0.8	0.63	2.34	3.28	1.3	9.47	19	49.80%	*OR rec fishery restricted to inside of 20 fm July 15–Sept 30
2017	Not yet available										20	Not yet available	*OR rec fishery closed Sept. 17 due to attainment of YE HG, among other species, reopened outside of 40 fm with longleader gear only on Oct 1. *CA rec fishery restricted to shallower depths north of Pt. Conception on Oct. 16

Table B-3. Washington Recreational Yelloweye Rockfish Harvest Guideline (HG), Projected and Actual Impacts (mt) 2007–18.

Year	HG	Projected	Actual	Actual/ Projected
2007	3.5	3.1	2.50	81%
2008	3.5	3.1	2.32	75%
2009	2.7	2.5	1.55	62%
2010	2.7	2.5	1.97	79%
2011	2.6	2.55	2.36	93%
2012 [a/]	2.6	2.55	3.20	125%
2013	2.9	2.4	2.09	87%
2014	2.9	2.4	2.81	117%
2015	2.9	2.83	2.51	91%
2016	3.1	2.83	3.19	113%
2017	3.3	3.1	3.15	102%
2018	3.3	3.1	--	--

a/ Inseason action taken to close the fishery September 4, 2012.

B.2.2 Impacts of Uncertainty on Fishing Communities

In 7 of the last 11 years, the Council has implemented additional restrictions, or complete closures, in recreational sectors (Appendix 1) to ensure that the ACL is not exceeded. However, post-season accounting has shown that total mortality averaged just 61 percent of the ACL in the past ten years (2007–16). The uncertainty in yelloweye rockfish projections and catch, as well as delays in total mortality estimates for some sectors, lead to intrasector buffering and precautionary management. This resource shortage strains fishing communities, particularly between commercial and recreational user groups within a community. Each sector faces restrictions on catch and costs of compliance, while often sharing marina space with participants from other sectors accessing the same resource under different management restrictions, including monitoring and retention requirements, season structures, and spatial/depth limitations.

Simultaneously, fishermen in the recreational and fixed gear sectors nearing full attainment of yelloweye rockfish see the low attainment in the trawl fishery and feel that the current allocation structure is unfair and inefficient. In both cases, fishermen see a different side of the situation's inequity. Tensions also exist within recreational communities, as inseason catch is variable between management areas within a state, between states, and seasonally. The patchy nature of this bycatch can result in early closures to entire fisheries if one area catches yelloweye rockfish at a high rate or if catch is particularly high early in the season, even if rates would be lower later in the season. Often anglers that fish early in the season, for example targeting halibut and lingcod in the spring, represent a different sector of the recreational fishing community than those preferring to fish later in the season when weather is more accommodating and people are more likely to take vacation. Because of delayed inseason catch estimates, higher than anticipated catch of yelloweye in the spring has the potential to close recreational bottomfish fisheries at the end of summer and can result in the perception that one group is being punished for another group's actions.

In addition to uncertainty creating tension between sectors, this variability in closures and restrictions is disruptive to all sectors in terms of planning and expectations. In public comment at Council and state meetings, recreational anglers from both private and charter sectors have expressed frustration about the unpredictability of inseason closures and modifications that restrict or diminish opportunities (e.g., reduced bag limits and changes in depths). For most, these trips require advanced planning to visit often remote coastal fishing communities and accommodate reservations for groups and tourists. For example, a recreational halibut angler may need to reserve moorage and lodging a year in advance or families may plan vacations around recreational fishing trips that occur late in summer when school is out. Inseason changes, often without significant notice, are not only disruptive but highly frustrating for both businesses and customers.

The Council and NMFS work quickly to restrict access to overfished stocks like yelloweye rockfish in order to rebuild them. Even as the stock's health improves, the process to consider modifications to management measures that increase opportunity to access the resource can be lengthy. This conservative approach can result in severely limited access to the resource during the rebuilding period. This can be especially problematic, because as a stock's health improves and approaches rebuilding, encounters are likely to occur at a higher rate, but are difficult to estimate. This "rebuilding paradox" can contribute additional uncertainty to catch projections at a time when stock health is actually improving.

The cumulative effect of these types of uncertainties have resulted in stakeholder reluctance to suggest management measures that might provide additional opportunity if they also raise the likelihood of increasing encounters with yelloweye rockfish. As yelloweye rockfish move closer to rebuilt status, stakeholders and managers alike have shown increasing interest in evaluating small changes to fishing restrictions that provide limited new opportunities as a means to restore stability to fishing communities, as long as there is some buffer between projected impacts and HGs. These ideas are discussed in more detail in the Needs of West Coast Communities section below.

B.3 Stock Status and Biology

B.3.1 Changes Since the Previous Assessment

As expected, the current 2017 benchmark assessment showed that some aspects of our understanding of stock biology and dynamics continued to develop since the previous benchmark assessment of yelloweye rockfish was conducted in 2009. An update assessment was performed in 2011 using the basic modeling framework, approach, and structural assumptions of the 2009 assessment. The 2017 assessment retained many features of the 2009 and 2011 assessments, but incorporated several improvements in modeling techniques and use of data, as well as updated parameters for steepness and natural mortality. Much of the content within this section is taken from the 2017 assessment (Gertseva and Cope 2017b) and the accompanying rebuilding analysis (Gertseva and Cope 2017a).

The spatial structure of the 2017 assessment changed from a three-area to a two-area model (California and Oregon/Washington combined), and the model changed from a two-sex model to a combined-sex model. The 2011 assessment calculated recruitment deviations deterministically using the stock-recruit equation. The 2017 assessment improved on that approach by estimating them within the model, allowing uncertainty around class size to be incorporated throughout the model. The 2017 assessment used fixed values for stock-recruit steepness and natural mortality obtained from meta-analytic studies (in the 2011 assessment, those values were estimated). The 2017 assessment also updated parameters for weight-length relationships, maturity schedule, and fecundity.

The 2017 yelloweye rockfish assessment model estimated recruitment deviations (instead of taking recruits deterministically from the stock-recruit curve as in the 2011 assessment), to better account for a

complex reproductive cycle of rockfish when recruitment varying from year to year and successful reproduction depends on pelagic larvae surviving to become benthic juveniles episodic recruitment (Love et al. 2002). This improvement reduced the overall uncertainty in the yelloweye rockfish assessment, and resulted in upgrading it from a Category 2 to a Category 1 assessment, which reduces the ABC buffer accordingly.

The updated catch time-series included new historical estimates for Washington commercial catches, updated estimates for Washington and Oregon recreational removals, and additional estimates of Washington and Oregon commercial catches from unspeciated market categories in PacFIN (e.g., URCK and POP1). Sensitivity analyses regarding fishery removals showed that the model is not sensitive to the alternative assumptions about catches, and changes in stock status associated with alternative assumptions about fishery removals of that scale were minimal. The magnitude of catch variation explored in sensitivity analyses was greater than the revisions to recent catch time series used in the model.

The 2017 assessment model represents the current state of knowledge and incorporates the most recent available estimates of stock productivity, natural mortality, catch time series, and ageing error, which have changed over time. Use of the most current information from research (e.g., meta-analyses to inform parameters, ageing and maturity studies, and recent biological data), modeling and statistical techniques, and optimum model structure to balance model detail with parsimony, enabled the most stable and accurate model available to describe stock dynamics. It was deemed best available science to inform management by the Stock Assessment Review (STAR) panel and the SSC, and was accepted by the Council as such. Stock assessments in the PFMC on the West Coast of the U.S. undergo one of the most rigorous review processes worldwide. The multi-stage process begins with internal NMFS review, followed by a week-long review by an international panel of experts (STAR panel), after which the assessment is either approved or sent back for additional work, and is re-reviewed at another panel later in the year. If accepted and endorsed by the STAR, the Council's SSC reviews the assessment at a meeting of the PMFC. Finally, the Council itself reviews the assessment as well.

Table B-4 summarizes key parameter values in the 2017 and 2011 yelloweye rockfish assessment models. Key changes, which were influential on the assessment results include an increase in productivity, defined by steepness of the stock-recruit relationship (h), from 0.442 in 2011 to 0.718 in 2017. This value was fixed at the mean of the prior distribution from the meta-analysis of ten Category-1 rockfish species off the U.S. West Coast (per SSC recommendation), as the model was unable to estimate it reliably. Natural mortality (M) also decreased slightly, from 0.046 to 0.044. Natural mortality was fixed at the median value of the prior distribution, estimated using the Hamel (2015) approach; the base model was unable to reliably estimate M, due to data limitations. Natural mortality was the primary axis of uncertainty, as is common among many groundfish assessments.

Table B-4. Summary of key parameters in the 2017 yelloweye rockfish stock assessment model, compared with those used in 2011 stock assessment.

Parameter	2017 Assessment both sexes combined	2011 Assessment Females (males in parentheses)
Natural mortality (M)	0.044	0.046 (0.045)
Individual growth		
von Bertalanffy K	0.06	0.05 (0.05)
Asymptotic length (cm)	64.08	63.99 (64.43)
Weight at length		
Coefficient	7.31281E-06	9.7659E-06 (1.70424E-05)
Exponent	3.24	3.17 (3.03)
Maturity at length		
Inflection	42.07	38.78
Slope	-0.40	-0.44
Fecundity at size a/		
Inflection	7.21847E-08	137,900
Slope	4.04	36,500
Stock-recruitment		
Ln(R_0)	5.39	5.43
Steepness (h)	0.718	0.442
Recruitment deviations	Estimated w/in the model	Not estimated; recruits taken deterministically from the stock-recruit curve

a/ Fecundity-at-length was estimated according to Dick et al. (2017) in the 2017 assessment; while fecundity-at-weight was previously used, in the 2011 update assessment (Dick 2009).

B.3.2 Critical Assessment Uncertainties Affecting an Understanding of Relative Productivity of Yelloweye Rockfish

The yelloweye rockfish ACL/Rebuilding Alternatives are affected by the assumptions made in the 2017 assessment, especially the assumed productivity parameters, the recruitment compensation or steepness (h) of the Beverton-Holt stock recruit relationship and the natural mortality rate (M). Given that the 2017 yelloweye rockfish stock assessment is the basis for the rebuilding analysis, the assumptions about h and M are relevant to rebuilding projections upon which proposed changes to harvest specifications and the current yelloweye rockfish rebuilding plan are based. This section explores the implications of uncertainty in steepness and natural mortality, in terms of management risk.

Both M and h are often difficult to estimate in stock assessments and they are often confounded when there is an attempt to do so. Reliable estimation of these parameters is dependent on long, contrasting time series of data that are often not available (Hilborn and Walters 1992; Conn et al. 2010). The yelloweye model was unable to reliably estimate these quantities, due to the short time-series of data, which are primarily available after the period of largest removals from the stock. In this common situation, stock assessment models often assume either a single value or a prior pdf for *M* and *h* for an individual stock from meta-analytic approaches that use data from multiple populations (Dorn 2002, Forrest et al. 2010, Punt and Dorn 2014).

Both parameters were estimated outside the 2017 assessment model and fixed in the base case model used to inform management in 2019 and beyond. Given the base case model in the 2017 assessment is the basis for the 2017 rebuilding analysis, the uncertainty associated with assuming M and h affect rebuilding projections upon which contemplated changes to harvest specifications and the current yelloweye rockfish

rebuilding plan are based. This section explores the implications of assuming steepness and natural mortality in terms of management risk. The sector-specific buffers between HGs and the ACTs are designed to provide some flexibility in managing these sectors given the uncertainty in future yelloweye rockfish impact projections and the ACTs are designed to keep overall impacts within those identified in Appendix A under Alternative 1 ACLs.

B.3.2.1 Model Sensitivity to Stock-Recruit Steepness

A noticeable change in the new yelloweye rockfish stock assessment is the assumed higher productivity as determined by a fixed value of steepness (h = 0.718). The steepness of the stock-recruitment relationship (h), which determines the productivity of a fish population, is one of the key parameters for understanding the dynamics of the stock and determining projected rebuilding. Higher steepness results in higher estimated yields and faster rates of rebuilding. Reliable estimation of this parameter is dependent on long, contrasting time-series of stock-recruit data that are often not available (Conn, *et al.* 2010; Hilborn and Walters 1992). The yelloweye rockfish assessment model was unable to reliably estimate this parameter due to the short time-series of data, which are primarily available after the period of largest removals from the stock. Therefore, h in the assessment model was fixed at the value of 0.718. This steepness value was derived in an updated meta-analysis using a likelihood profile approximation to a maximum marginal likelihood mixed-effect model for steepness from ten Category-1 rockfish species off the U.S. West Coast assessed in 2015 (James Thorson, personal communication). This analysis updates our understanding of rockfish stock productivity in the Northeast Pacific Ocean, since it accounts for strong year classes in the recent data incorporated in the stock assessment. Increases in this parameter estimate have contributed to the rebuilt status of several West Coast rockfish stocks, including canary rockfish (Thorson et al. 2018) and widow rockfish (He et al. 2011). Use of the current prior mean for stock-recruit steepness is consistent across West Coast rockfish assessments and was endorsed for use in the 2017 yelloweye assessment by the STAR panel and SSC as best available science.

The previous assessments (the full 2009 and updated 2011 assessments) allowed natural mortality and steepness to be estimated, while the 2017 assessment fixed both of these key parameters, which allowed recruitment deviations to be estimated for this species. Estimating recruitment deviations means estimating relative year class strength. This change reduced the uncertainty in the yelloweye rockfish assessment resulting in upgrading this stock assessment from a category 2 to a category 1, which effectively reduces the ABC buffer. However, fixing steepness resulted in a new critical uncertainty relative to the stock's actual potential productivity.

The 2017 assessment was sensitive to steepness and whether selectivity was allowed to be estimated freely. Steepness values estimated in the 2009 and 2011 assessments were 0.417 and 0.441, respectively. Gertseva and Cope (2017a) provided alternative rebuilding projections assuming lower steepness values (i.e., h = 0.4 and 0.509) than under the base case model (h = 0.718). The assumed removals in 2019 and beyond[15] are full ACL attainment projected under the base case model in the 2017 assessment. These removals were assumed for the alternative steepness models to project long term status trends. While the base model steepness is predicted to attain the B_{MSY} target of 40 percent of unfished biomass by 2027, the 0.509 steepness fails to reach the target through the current target year of 2074 and the 0.4 steepness model projects the status to remain below the minimum stock size threshold through 2074, reaching a maximum depletion of 16.5 percent in 2027 before slowly declining to 13.5 percent in 2074 (Figure B-3). If the 2017 yelloweye rockfish assessment assumes a much higher steepness (productivity) than is the actual state of nature for the stock, rebuilding objectives may not be met under the current rebuilding

[15] It was assumed the 2017 and 2018 ACLs would not be fully attained and that removals in those two years would be at 65% of ACL attainment as recommended by the GMT.

plan. Higher catches considered under the SPR alternatives of 70 percent and 65 percent would exacerbate this outcome if assumed steepness is too high.

The potential cost of errors regarding steepness was explored in the 2017 yelloweye rockfish assessment through analysis of model sensitivity to alternative values of steepness, and through likelihood profile analyses. The stock-recruit steepness represents the proportion of average unfished recruitment achieved at 20 percent of unfished spawning output and ranges from 0.2 to 1 (the higher value indicates the higher productivity of the stock). The likelihood profile for steepness from the 2017 yelloweye rockfish is shown in Figure B-4. The negative log-likelihood for the yelloweye rockfish assessment model declines with increasing steepness up to the value of 0.9, which is considered to be implausible for a slow-growing rockfish.

Time-series of relative spawning output associated with different values of steepness, ranging from 0.3 to 0.9, are shown in Figure B-5. The terminal-year relative spawning output estimates in these runs ranged from 10 to 34 percent, and the base assessment model estimated the spawning output of the stock to be at 28.4 percent of its unfished level.

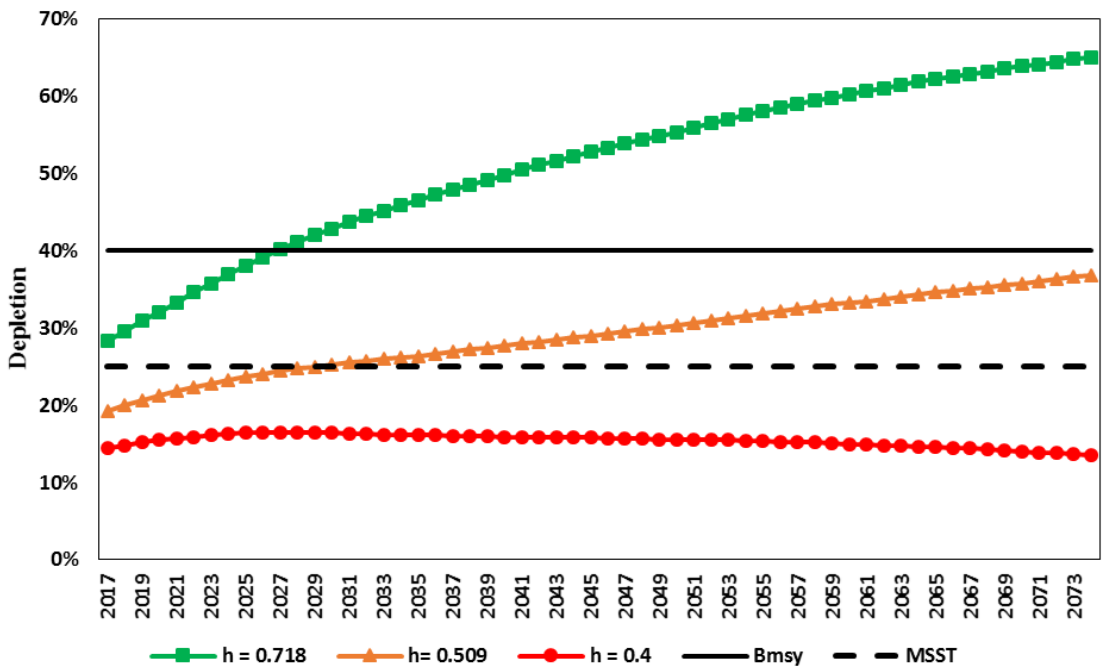

Figure B-3. Projected depletion of yelloweye rockfish assuming catches from the current base case model (h = 0.718, SPR = 76%) under alternative steepness assumptions (h = 0.509 and 0.4).

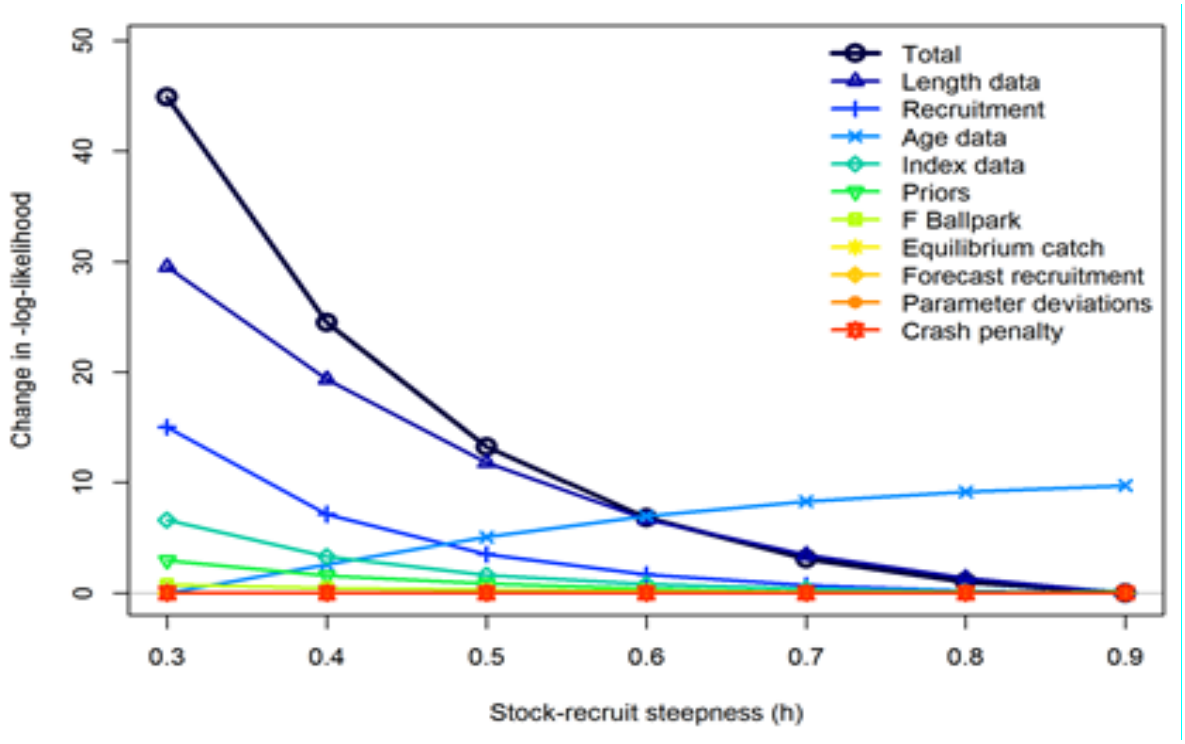

Figure B-4. Negative log-likelihood profile in total and for each data component in the 2017 yelloweye stock assessment, over the range of steepness from 0.3 to 0.9 by increments of 0.1 (from Gertseva and Cope (2017b)).

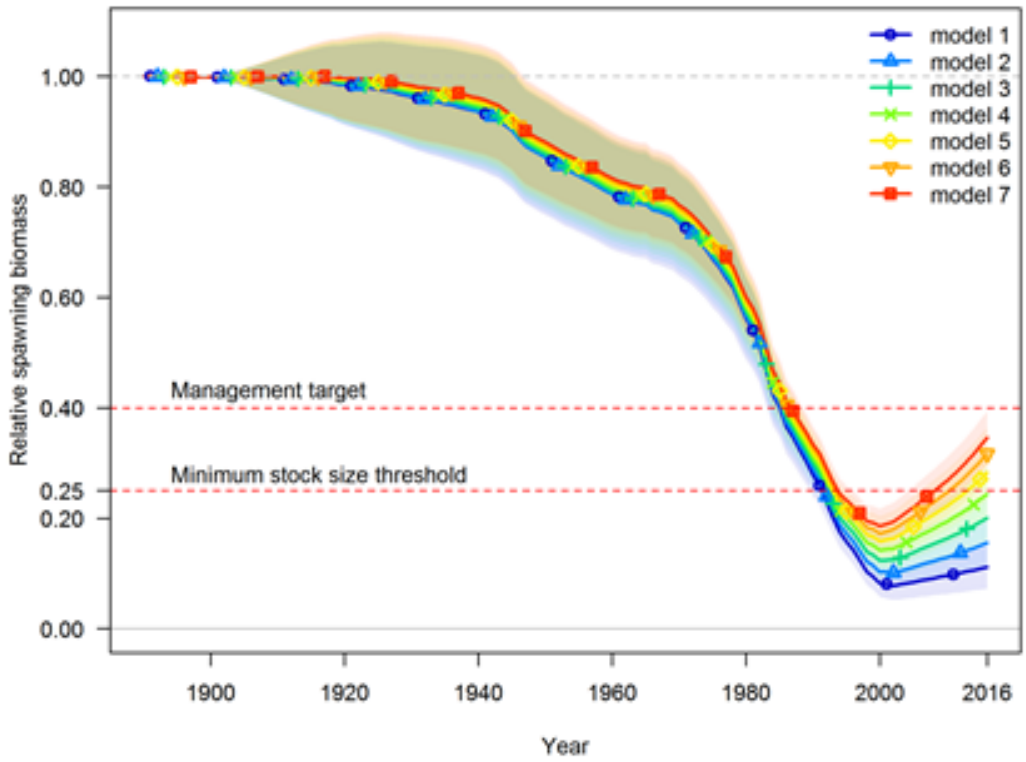

Figure B-5. Time series of relative spawning output associated with values of steepness ranging from 0.3 (Model 1) to 0.9 (Model 7) by increments of 0.1 (from Gertseva and Cope 2017). Steepness is 0.7 in Model 5.

B.3.2.2 Projected Rebuilding Probabilities

In the rebuilding analysis, for scenarios with no or very low levels of fishing removals (higher SPR values), the projected probability of rebuilding exhibited a knife-edge behavior, where probabilities of rebuilding increased steeply from 0 to 100 percent over a single year (see Table 4 of the rebuilding analysis, (Gertseva and Cope 2017a)). This occurs because a sequence of strong year classes from 2007 to 2011 (estimated by the assessment model) joined the spawning population and reached the fishery. Under a low level of fishing, the stochastic runs performed as a part of the rebuilding analysis did not show much contrast in the rebuilt state, and the strong recruitment (with the higher recruitment compensation) dominated the behaviors, causing the stock to go beyond the target reference point in the same year. With a higher level of fishing (lower SPR values), the knife-edge behavior was not evident (see Scenarios 4-11 in Table 4 of the rebuilding analysis, (Gertseva and Cope 2017a)).

In November of 2017, the SSC reviewed and endorsed the revised yelloweye rockfish rebuilding analysis (Agenda Item F.4, Attachment 2, November 2017) and noted that an unexpected result of the analysis was that the probability of rebuilding changed from 0 to 100 percent over a single year (2027). Its interpretation was also that this occurred due to a set of strong year classes from 2007 to 2011, which are expected to join the spawning population near 2020; this is expected to result in the projected spawning biomass exceeding the target biomass by 2027.

The SSC further noted that the rapid change in rebuilding probability occurred because full assessment uncertainty surrounding starting biomass and age-structure was not modeled in the rebuilding analysis. This is acceptable under the Terms of Reference for Groundfish Rebuilding Analyses, and the standard software used to generate rebuilding analyses on the West Coast was used in this analysis.

Yelloweye rockfish catches have been lower than the ACL, and the stock has been rebuilding faster than anticipated, based on previous rebuilding analysis.

B.3.2.3 Ageing Error

Another critical uncertainty that affects our understanding of yelloweye rockfish productivity is ageing error, which directly affects estimation of the natural mortality rate. Gertseva and Cope (2017b) used a maximum age metric to determine the natural mortality rate for yelloweye rockfish based on the method developed by Hamel (2015). Application of this method results in lower estimates of natural mortality for fishes with higher maximum ages. A lower natural mortality rate translates into relatively lower potential productivity with the same effect of predicting lower estimates of spawning output, year class strength, and population rebuilding rates as lower estimates of steepness.

Ageing otoliths of longer lived rockfish is inherently uncertain with greater uncertainty in assigning ages for older individuals. Yelloweye rockfish is one of the longest lived rockfish on the U.S. West Coast with a maximum reported age of 147 years (Love 2011).

There are two main sources of yelloweye rockfish age data that are used in the assessment: age estimates generated by the Washington Department of Fish and Wildlife (WDFW) and those aged by the Northwest Fisheries Science Center (NWFSC). Until 2017, WDFW was the only agency ageing yelloweye rockfish samples collected coastwide (e.g., by CDFW, ODFW, International Pacific Halibut Commission [IPHC], and others). The methods and criteria used by WDFW to estimate yelloweye rockfish ages were evaluated and agreed upon by the Committee of Age Reading Experts (CARE) in 2008. The NWFSC ageing lab began ageing yelloweye rockfish in 2017, using the same criteria as WDFW age readers. Age and length as well as growth estimates from each ageing lab were similar.

Gertseva and Cope (2017b) report there was general agreement in age assignments by readers from both labs up to about age 30. However, after age 30, age assignments were systematically greater for readers in the WDFW lab compared to readers from the NWFSC lab, with up to a 20 year difference in age assignments for older yelloweye rockfish. This disagreement indicates greater uncertainty and bias in determining the ages of older individuals. A limited third party read of U.S. West Coast yelloweye rockfish otoliths by readers from the Alaska Department of Fish and Game (ADFG) was insufficient to better determine ageing precision or which lab was more biased.[16] Ages used in the 2017 yelloweye rockfish stock assessment were based on the WDFW age estimates for most fleets and surveys, except for the California recreational fleet, the most recent years of the Oregon recreational fleet, and the NWFSC trawl survey, of which age estimates from the NWFSC lab were used. Ageing error matrices were therefore developed from within-lab comparisons for each set of ageing data and bias in ageing older yelloweye rockfish was not determined.

In the 2017 assessment, two ageing errors were included (one for each ageing laboratory that generated the ages). The assessment explored model sensitivity to different assumptions about ageing errors. None of the alternative runs produced appreciable differences in the model results.

[16] Evaluation of yelloweye rockfish ageing criteria and interlab reads, including those done by WDFW, NWFSC, ADFG, and DFO labs is ongoing. This will enable better determination of bias and precision in ageing yelloweye rockfish before the next assessment is conducted.

The oldest individual in the age sample informing the 2017 yelloweye rockfish assessment was 137 years. Given the uncertainty in estimating the actual maximum age, 90 percent of the maximum age was assumed, which gave the value of 123 years resulting in an estimate of M = 0.044. Attempts to estimate natural mortality indicated there was no information in the model to do so, so M was fixed using this value in the base case model. Uncertainty in estimating M was not fully characterized in the 2017 assessment given ageing error and the inability to estimate M. Given the inability to determine bias and better estimate precision in ageing older yelloweye rockfish, one can conclude this is a critical uncertainty that should be considered when basing management decisions on rebuilding projections. If the actual state of nature is a lower natural mortality rate, then stock biomass, relative depletion, and rebuilding rates are lower than used to estimate these quantities under the most plausible base model[17]. The decision table in the 2017 assessment is reproduced in Table B-5 to understand the effect of lower and higher natural mortality rates on these quantities. The lowest state of nature in the decision table (M = 0.037) is lower than used in the current and previous yelloweye rockfish assessments. For comparison, Taylor and Wetzel (2011) estimated natural mortality rates of females and males of 0.046 and 0.045, respectively in the 2011 update assessment. However, the decision table does illustrate the relative effect on productivity across a range of plausible natural mortality rates.

[17] The SSC recommended the base case model in the 2017 yelloweye rockfish assessment as the best scientific information available in their September 2017 statement to the Council.

Table B-5. 12-year projections for alternate states of nature based on natural mortality of yelloweye rockfish (reproduced from Gertseva and Cope (2017b)).

			States of nature					
			Low: *M* =0.037		Base model: *M* =0.044		High: *M* =0.056	
Management decision	Year	Catch (mt)	Spawning output	Depletion	Spawning output	Depletion	Spawning output	Depletion
2017-2018 catches are 60% of ACLs. 2019-2028 are 60% of catches calculated using current rebuilding SPR of 76% applied to the base model.	2017	12	227	20%	323	28%	535	43%
	2018	12	238	21%	338	30%	556	44%
	2019	17	249	22%	353	31%	578	46%
	2020	18	260	23%	368	32%	599	48%
	2021	19	271	24%	384	34%	621	50%
	2022	20	282	25%	399	35%	643	51%
	2023	21	294	26%	415	36%	665	53%
	2024	22	304	27%	430	38%	687	55%
	2025	22	315	28%	444	39%	707	57%
	2026	23	325	29%	458	40%	726	58%
	2027	23	334	30%	471	41%	744	59%
	2028	24	343	31%	483	42%	760	61%
2017-2018 catches are full ACLs. 2019-2028 catches are calculated using current rebuilding SPR of 76% applied to the base model.	2017	20	227	20%	323	28%	535	43%
	2018	20	237	21%	337	30%	555	44%
	2019	29	247	22%	351	31%	576	46%
	2020	30	257	23%	365	32%	596	48%
	2021	31	267	24%	379	33%	617	49%
	2022	33	277	25%	394	35%	638	51%
	2023	34	286	26%	408	36%	659	53%
	2024	35	296	27%	421	37%	679	54%
	2025	36	304	27%	434	38%	698	56%
	2026	37	313	28%	446	39%	715	57%
	2027	38	320	29%	457	40%	731	58%
	2028	38	328	30%	468	41%	746	60%

B.4 Research

Among the research needs described in the 2017 assessment, these primary needs affect central parameters and assumptions which have large effects on model results. The following points were taken directly from the current yelloweye rockfish assessment:

- *The available data for yelloweye rockfish remains relatively sparse given the limited sampling effort available under the rebuilding plan. It is essential to continue yelloweye data collection, especially in this recent period, when commercial and recreational catches are considerably lower than the historical period, to provide a fuller picture of age structure and population dynamics. Further length and age collections will also refine estimate of year class strength in the late 2000s, which will improve estimates of stock status and productivity.*

- *Poorly informed parameters, such as natural mortality and stock-recruit steepness will continue to benefit from meta-analytical approaches until there is enough data to estimate them internal to the model. A more thorough examination of yelloweye rockfish longevity off the West Coast of the United States is needed to get a better understanding of natural mortality.*

- *The age data used in the 2017 assessment were generated by two ageing laboratories, the WDFW ageing lab and the NWFSC ageing lab. Even though growth estimates from these two labs are similar, there are still questions regarding the level of bias and precision in the ages coming from each lab. A larger, systematic comparison of age estimates between labs as well as with outside agencies could help resolve the issue of between-lab agreement. To this end, WDFW and NWFSC labs have been in correspondence and are currently seeking resolution to this issue.*

- *Additional research is needed to continue to refine historical catch estimates. Disentangling catch and biological records between Oregon and Washington would allow further spatial exploration. A better quantification of uncertainty among different periods of the catch history among all states would also be beneficial. These issues are relevant for all West Coast stock assessments* (Gertseva and Cope 2018)

Additional related research needs, such as alternative methods for assessing untrawlable habitats, can be found in the 2013 Research and Data Needs document.

B.5 Needs of West Coast Communities[18]

Fishing on the U.S. West Coast presents a diverse range of fishing opportunities in both state and federal waters. With approximately 1,300 miles of coastline, recreational anglers and commercial fishermen target tuna, crab, shrimp, Chinook and coho salmon, Pacific halibut, and many species of groundfish. West Coast fishing communities have generally relied on a portfolio of fishing opportunities to balance large swings in target stock availability; with changing ocean conditions possibly exacerbating instability in primary target stocks, commercial and recreational fishermen may increasingly rely on groundfish to sustain annual operations. Additionally, some West Coast fishermen also rely on participation in fisheries off of Alaska, like the Gulf of Alaska Pacific cod fishery, which has recently experienced a significant downturn. Many fishermen also participate in Alaskan salmon fisheries. Therefore, community impacts are best addressed by examining changes in all commercial and recreational fisheries as a whole, rather than focusing groundfish, since all contribute to the jobs, wages, and overall health of the communities.

Since 2011, revenue across the West Coast for many species groups has been generally lower than that of the 2000s, including for shrimp, salmon, and HMS. Ocean conditions were variable due to impacts from: the ongoing drought in California, climate change, ocean pollution and acidification, El Niño and La Niña, the warm water "blob" and associated domoic acid outbreaks, and the recurrent boom-and-bust cycles for ecosystem-centric forage fish, such as sardine and anchovy. These impacts can have dramatic effects on populations of West Coast target species, including salmon, whose survival has been shown to decrease at various life stages during prolonged drought and recurring El Niño events (NMFS WCR National Saltwater Recreational Fisheries Policy). Management of various salmon stocks listed under the Endangered Species Act has particularly restricted recreational salmon fishing effort in recent years. Domestic and international management measures to reduce fishing mortality on the overfished highly migratory Pacific bluefin tuna have led to reduced bag limits in recreational fisheries.

While overall levels of commercial and recreational activity best define the overarching community "needs," the strength and stability of individual fisheries should also be considered in order to recognize that harvesters and processors participate in the different sectors. For example, a strong shrimp year will

[18] Extensive work has been done in the past to both identify and profile West Coast fishing communities. This includes identification and classification of ports by a variety of social and economic indicators. Starting with these previously recognized communities, analysts used recreational trip and commercial landings data to single out West Coast fishing communities most likely to be impacted by potential revisions to the yelloweye rebuilding plan.

benefit trawlers and larger-scale processors, but would be of little benefit to help offset losses to charter businesses or small-scale processors associated with declines in salmon. This underscores the importance of having diversified fisheries within communities, as several of the main fisheries, including crab, sardine, shrimp, and tuna, are prone to "boom-and-bust" cycles.

Effects of fishing regulations on communities, including the social environment, are difficult to analyze due to complex socio-ecological interactions and a lack of quantitative data. However, while quantifying the impact of both management and fishing condition uncertainty on communities beyond the information provided above is difficult, a variety of social indicators can describe the overall socio-economic vulnerability of a community, as well as its dependence on fishery resources. Dependence is a function of both a community's engagement in fishing activities and overall reliance on fishing, with highly dependent communities most likely to experience impacts from management changes (for more detailed explanation of indicators and methodology, see Jepson and Colburn (2013). Vulnerability reflects social stressors, including crime, poverty, and unemployment among other socio-demographic measures. Vulnerability also depends on natural systems, including weather, climate change, and resource depletion, and built systems, such as infrastructure. Vulnerable communities are less likely to successfully navigate disruptive events such as fishery closures, as they may be unable to access substitute resources. Many of the communities that analysts identified as impacted by yelloweye rockfish management measures are ranked high on at least one of these indices, with Westport and Ilwaco, WA; Coos Bay, OR; and Fort Bragg, CA standing out as highly vulnerable and highly dependent on both recreational and commercial fisheries.

Underlying all of these changes to fishing opportunities is the need for adequate infrastructure, including harbor facilities, routine dredging, providers of fishing gear and vessel maintenance, access to ice and bait, buyers and processors, and the providers and services required in turn by those buyers and processors. The fishing fleet and processors are interdependent, making it important to assess changes to infrastructure that affect both aspects of the industry.
If the number of fishers decline to such an extent that infrastructure collapses, "fishing" communities may lose their fishing heritage altogether (Wingard 2000). Appendix D of the West Coast Groundfish Trawl Catch Share Program – Five Year Review has an extensive review of infrastructure changes from the pre-2011 period to 2011–15, for most major West Coast commercial ports.

Given the concurrent overfished status of several other species and subsequent effort-limiting management measures, any changes in vulnerability, including declines in infrastructure for both commercial and recreational fisheries, cannot be ascribed exclusively to yelloweye rockfish rebuilding. However, other than cowcod (which is less of a constraint north of Pt. Conception), all overfished species are now rebuilt, so low yelloweye rockfish ACLs will likely be the main constraint to fisheries relied on by these communities.

B.5.1 Long-Term Coastwide Considerations of the Alternatives

The MSA prioritization of short rebuilding timelines generally benefits the long-term interests of communities dependent on fishery resources. Further, short-term community benefits from increased access to a rebuilding resource come at the expense of long-term gains achieved once the stock is rebuilt. Analysts note that, in contrast to prior rebuilding decisions that spanned decades, the cumulative long-term impacts from rebuilding yelloweye rockfish earlier under No Action may be negative, relative to moderate increases under Alternative 1 or Alternative 2, with an increase in rebuilding time of only one or two years, respectively. The median time to rebuild across all three alternatives is within three years from No Action to the longest timeline under Alternative 2. Within ten years of implementation of the 2019–20 harvest specifications, the stock is projected to rebuild under any of these three scenarios. In contrast to these similar outcomes for rebuilding yelloweye rockfish, the ability of these alternatives to meet the

immediate needs of West Coast communities vary greatly, with the short-term survival of some recreational-dependent ports in doubt.

Projections of ACLs more than two years out incorporate substantial uncertainty, but do provide some information about cumulative, long-term effects for communities based on best available stock information. Specifically, Table B-6 indicates that by 2029, yelloweye rockfish is predicted to be rebuilt under all three alternatives. As of 2029, Alternative 2 will have provided communities with cumulative 8.4 percent more yield compared to No Action. Over the next decade, cumulative effects of increased access to this resource will likely translate to increased utilization of currently under-attained target species stocks, increased recreational and commercial sector opportunity, insulation from shocks in other fisheries, and potential rebuilding of diminished port infrastructure in vulnerable, dependent communities. Alternative 1 would provide 17.8 mt over No Action, but 3 percent less than Alternative 2 (Table B-6).

Table B-6. ACLs (mt) under each alternative, and cumulative 2019–2029 sum, with MSY = 109 mt.

Year	No Action	Alt1	Alt2
2019	29.1	38.6	47.4
2020	30.1	39.7	48.8
2021	31	40.9	50
2022	31.9	41.9	51.2
2023	32.7	42.9	52.3
2024	33.5	43.8	53.3
2025	34.2	44.7	54.2
2026	34.9	45.5	55
2027	109	46.2	55.8
2028	109	109	56.6
2029	109	109	109
Cumulative Sum	584.4	602.2	633.6

All three alternatives would rebuild within a three year period, and, at the end of rebuilding, the ACL would be set to the MSY. As pointed out in the original rebuilding plan in 2003, the true value of an overfished species may lie not in harvest of the species itself, but rather in the increased access to targeted species that co-occur with rebuilding stocks that have low OY levels. Such is the case with yelloweye rockfish. Social scientists have observed both social and economic “discount rates” for future yields; meaning, an additional dollar (or pound of yelloweye rockfish) is generally worth more to individuals/communities in the present than in the future. An additional metric ton of rebuilding species OY is probably worth more to address the needs of fisheries now, outlined in the Community Needs Analysis, than in the future when OY is higher, and therefore, less constraining on bycatch allowed in the target fishery.

Managers are thus responsible for balancing these immediate needs with those of future generations. Given the relatively small difference in future rebuilding timeline, the resource access needs of future generations would likely be met under any of the alternatives.

B.5.2 Commercial Fisheries

For commercial fisheries, there was a period of high economic activity in the years surrounding adoption of the current rebuilding plan in 2011 (Figure B-6). In general, since yelloweye rockfish was declared overfished in 2002, economic activity was at the highest levels from 2010–12 for Washington ports and around 2011–13 for Oregon and California ports. These years were characterized by strong salmon returns, an expansion of Dungeness crab opportunities, and the rebuilding of target species Petrale sole and widow rockfish.

However, there have been considerable declines in commercial fishery economic activity in recent years. The Secretary of Commerce has declared disasters in a number of West Coast fisheries, including the Washington Ocean Troll in 2016, tribal salmon fisheries in 2015–16, sardines in 2015–16, Washington tribal crab in 2015, and California Dungeness/rock crab in 2015–16. Revenues have decreased for nearly all communities relative to the 2010–13 highs, and some communities, such as Tillamook, Crescent City, Eureka, and Fort Bragg, have dropped below the 2002–10 levels utilized in the 2011 revision of the yelloweye rockfish rebuilding plan. The declines are primarily due to downturns in other fisheries (e.g., salmon, sardine, and shrimp) rather than groundfish declines attributable to yelloweye rockfish constraints. If recent trends in non-groundfish fisheries continue, as typical in past “bust” cycles, then overall revenues would be expected to continue to decline in the next few years.

The recent sharp decline in commercial fisheries coastwide for 2017 could have been greater had it not been for relatively strong Dungeness crab and whiting seasons offsetting losses in other fisheries. The general surge in commercial fishery revenues from 2009–16 was mainly attributed to near record highs for the crab, shrimp, salmon, and whiting fisheries all coinciding. Subsequent declines in these fisheries have resulted in 2017 commercial fishery values ~$150-$200 million lower than 2010–16 highs, which is within the upper range of 2002–10 levels that were considered when revising the yelloweye rockfish rebuilding plan in 2011. If Dungeness crab and whiting were to fall another $75-$100 million combined, to values more typical of those fisheries prior to 2011, then total commercial fishery values could fall below 2002–10 levels.

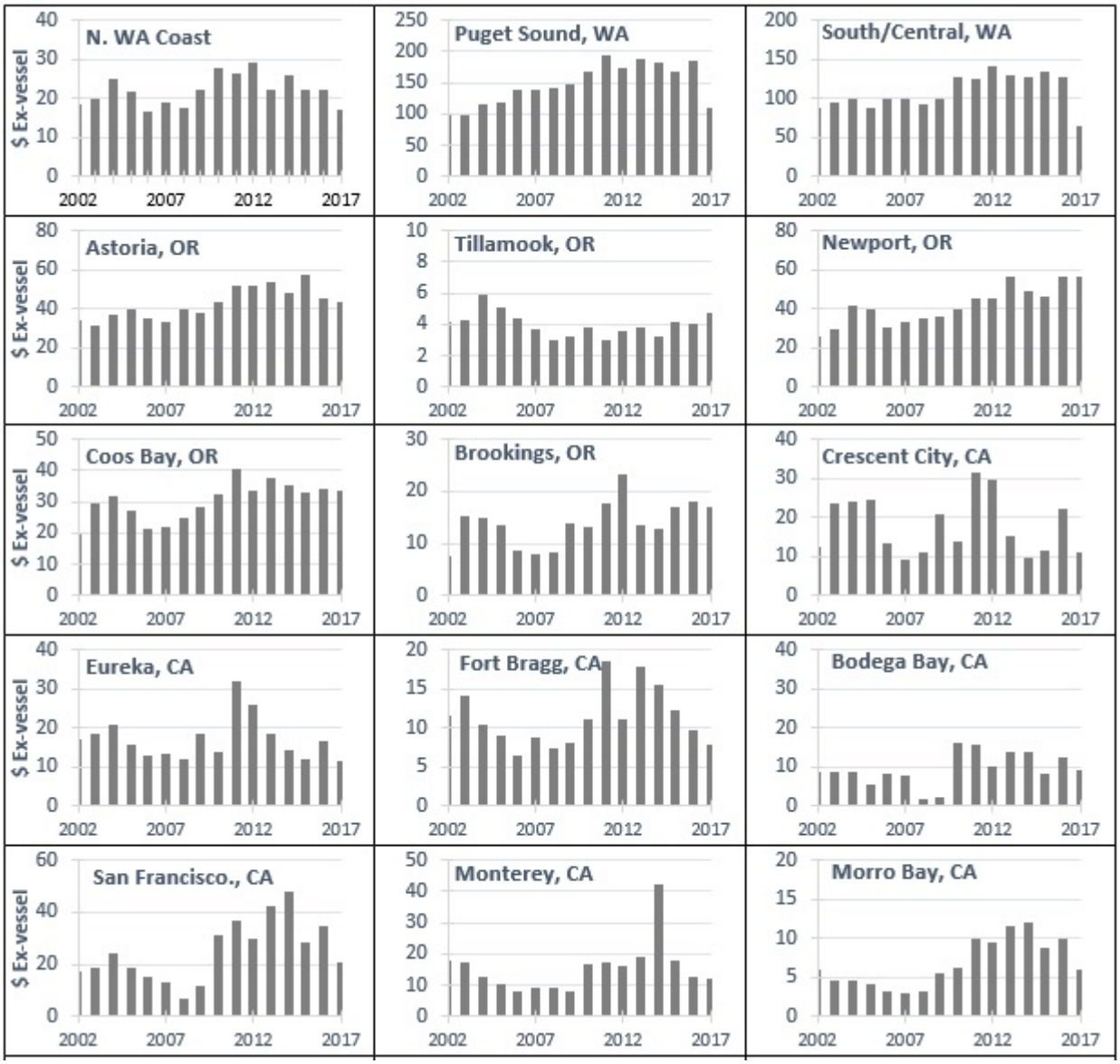

Figure B-6. Total ex-vessel revenue (in millions of inflation adjusted $USD) paid to harvesters for all commercial fisheries by community group and year. Overwinter crab seasons reported in first calendar year (e.g., 2015–16 as 2015).

B.5.2.1 Effects of Alternatives on Commercial Fisheries

Looking forward, the conditions of West Coast communities are different than those that were assessed in 2011 when this rebuilding plan was adopted. In the near future, the sardine fishery is expected to remain closed until the stock rebounds from a population crash; salmon fisheries are expected to remain at fractional harvest levels until environmental conditions improve; and the 2018 pink shrimp forecast is poor due to low abundance of the older age classes harvested by the fishery. Additionally, Pacific halibut quotas may be reduced based on recent assessment results. However, most important to these communities are the possible declines in the Dungeness crab and Pacific whiting fisheries that have maintained overall values and offset losses in other fisheries. These “boom-and-bust” fisheries have been at near record highs (“boom”) and are prone to returning to lower levels (“bust”; Figure B-7).

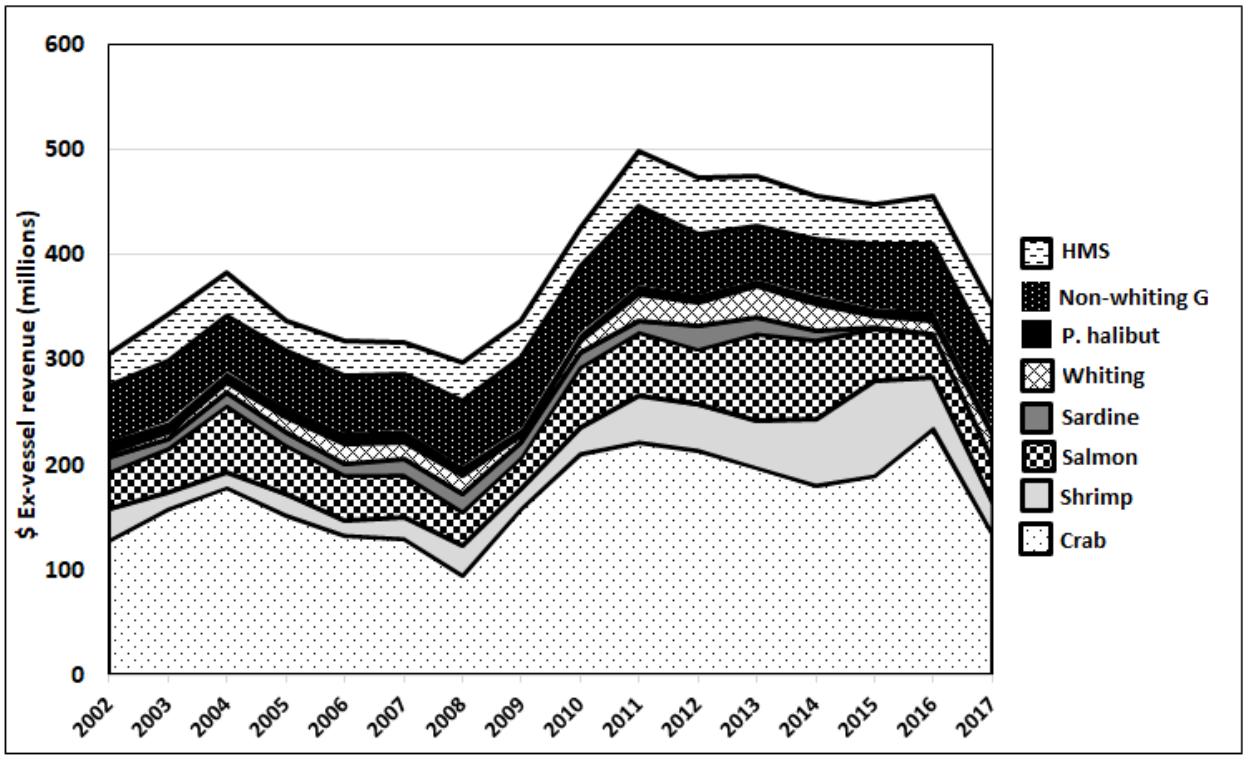

Figure B-7. Ex-vessel revenues (in millions of inflated adjusted $USD) of major West Coast commercial fisheries. Overwinter crab seasons reported in first calendar year (e.g., 2015–16 as 2015).

With other opportunities for West Coast communities on the decline, higher yelloweye rockfish ACLs being considered under Alternatives 1 or 2 could help restore, and preserve, stable commercial fishing revenues, as there is considerable potential value of underutilized groundfish stocks that are constrained by yelloweye rockfish (Table B-7). As described below, the No Action ACLs may not provide the opportunities to optimally access some of these underutilized stocks, which are projected to be worth $20.6 million in ex-vessel revenue, $43.6 million in income, and 2,300 jobs.[19]

For fixed gear (non-nearshore, nearshore) fisheries, the projected value of unutilized northern lingcod and mid-water rockfish (i.e., widow, canary, and yellowtail rockfishes) allocations constrained by yelloweye rockfish is estimated to be worth $20.6 million in ex-vessel revenue, $35.6 million in personal income, and 2,205 jobs in 2019 (Agenda Item F.2.a Supplemental GMT Report 1 April 2018). For the shorebased IFQ program, lingcod is also described as being constrained by yelloweye rockfish. The projected value of the uncaught northern lingcod IFQ allocation in 2019 of 1,189 mt is $2.5 million in ex-vessel revenue, $6.2 million in income, and 73 jobs. For the 426.5 mt of uncaught southern IFQ lingcod, the projected value is $0.9 million in ex-vessel revenue, $1.8 million in income, and 22 jobs.

[19] The analysis here and below attempts to estimate the potential income impacts for the communities under No Action, Alternative 1, and Alternative 2. It is important to note that, while estimated income impacts from the alternatives above for these community groups are provided in the Preliminary Draft Environmental Assessment, April 2018, these impacts were not estimated with respect to the suite of liberalized management measures possible under Alternative 1 or 2 for all sectors; therefore, they are only representative of short-term but not long-term benefits that could be obtain via future changes to management measures in response to higher yelloweye rockfish ACLs

Table B-7. Potential value of the main uncaught groundfish allocations that are constrained by yelloweye rockfish, and could be the source of economic benefits with higher yelloweye rockfish ACLs.

Unutilized allocation type	Ex-vessel revenue ($ million)	Income ($ million)	# Jobs
Fixed Gear- N. lingcod and rockfish	20.6	35.6	2,205
IFQ N. lingcod	2.5	6.2	73
IFQ S. lingcod	0.9	1.8	22
Total	24.0	43.6	2,300

Under No Action, commercial fisheries have limited opportunities to offset the loss in other fishing opportunities, due in part to the non-trawl RCA and quota still likely to be constraining. However, the higher ACLs associated with Alternatives 1 and 2 could help fishermen and communities recover from current and future economic downturns. The following sections attempt to quantitatively and qualitatively describe economic potential of increased access to underutilized groundfish stocks constrained by yelloweye rockfish amongst the ACL alternatives.

Note that it is difficult, if not impossible, to precisely project economic differences since the potential gains with additional yelloweye rockfish allocations are uncertain, as they are based on rather large shifts in fishery fundamentals. For the non-trawl sectors, the potential gains would effectively require modifications to the non-trawl RCA to increase fishing grounds and increasing trip limits of target stocks (e.g., lingcod); both measures are currently used to minimize yelloweye rockfish bycatch. For the trawl fisheries, potential gains in underutilized stocks constrained by yelloweye rockfish would be mainly due to the potential for enhanced market-flow of yelloweye rockfish bycatch quota in the IFQ fishery. Potential gains for each of these sectors is described below.

B.5.2.2 Fixed Gear Impacts

For the 2019–20 biennium, there is little projected impact to the fixed gear sectors under any of the rebuilding plan alternatives, as the non-trawl RCA will remain the biggest constraint on the fishery. Low attainments of lingcod and mid-water rockfishes are attributed to low trip limits and the non-trawl RCA of which both exist to minimize impacts of yelloweye rockfish. Only 4.5 percent of allocations and potential value of these stocks is currently utilized (Agenda Item F.2.a Supplemental GMT Report 1 April 2018). The potential value of uncaught fixed gear allocations (nearshore and non-nearshore) of groundfish stocks in 2019 constrained by yelloweye rockfish is $20.6 million in ex-vessel revenue, $35.6 million in personal income, and 2,205 jobs (Table B-7). Thus, while projected benefits in 2019–20 are minimal, the longer-term benefits of potential changes to trip limits and the non-trawl RCA possible under either Alternative 1 or 2 likely best meet the long-term needs of the communities, with only one to two additional years of rebuilding time.

While there have been numerous requests in recent bienniums to increase opportunity for lingcod and shelf rockfish stocks, only minor increases have been adopted due to tight yelloweye rockfish constraints. These increases have included: (1) shifting the shoreward boundary from 20 fathoms (fm) to 30 fm in 2015 between 40°10’ N lat. and 42° N lat. and 30 to 40 fm 2017 between 34°27’ N lat. and 40°10’ N lat.; (2) shifting the seaward boundary from 150 fm to 125 fm in 2017 from 34°27’ N lat. to 40°10’ N lat.; and (3) modest increases to shelf rockfish and lingcod trip limits in 2017 and 2018.

Similarly, there have been minimal opportunities for EFPs of experimental fixed gears designed to selectively catch rockfish or lingcod. In recent bienniums, there has been as little as 0.1-0.2 mt of yelloweye rockfish set aside for EFP yelloweye rockfish impacts due to lack of EFP participants. For 2019–20, three of the four EFP proposals allowed limited fixed gear opportunity within the non-trawl RCA. While the Council could consider expanding these three EFPs in June 2018, the biggest impact will likely be in the long term by allowing for more extensive data gathering. As described below, the projected impacts of opening the non-trawl RCA are highly uncertain due to the lack of recent data in these areas.

This conservative approach would continue in 2019–20 with limited management measures considered with immediate benefits (such as increase to LE and OA fixed gear trip limits for lingcod north of 40°10' N lat. and increases to the lingcod salmon troll ratios), and therefore there appears to be little, if any, economic impact differences amongst the yelloweye rockfish ACL alternatives in Agenda Item F.2, Attachment 3, April 2018. However, as described in the overarching benefits section above, there does not appear to be short-term benefits in 2019–20 only because the Council did not consider new management measures that could optimize the benefits of Alternative 1 and 2. In reality, there could be tens-of-millions of revenue and income and thousands of jobs associated with uncaught allocations of groundfish that could be obtained in the future with re-openings of the RCA and increases to trip limits.

While No Action allocations are higher than in the past, when the Council was initially considering management measures (i.e., prior to the selection of the PPA), they were not high enough to prompt the Council to propose more increases to lingcod or shelf rockfish trip limits or non-trawl RCA modifications. While the projected impacts were within No Action ACLs, the Council noted these projections are uncertain and have the potential to be much higher; especially in the nearshore fishery where yelloweye rockfish impacts can vary 2-3 times across years. All of the fixed gear management measures had low impact to yelloweye rockfish and therefore are likely not reflective of the more expansive long-term benefits that could be achieved in subsequent bienniums.

If the Council were to select Alternative 1 or 2 as the new HCR for the rebuilding plan, it would provide a path to critical opportunities to fixed gear communities over the next decade of rebuilding. As will be discussed below, No Action does not provide for enough yelloweye to consider significant changes to the non-trawl RCA or trip limits to access the available and healthy lingcod and shelf rockfish stocks.

Although the proposal to move the seaward boundary of the non-trawl RCA from 40°10' N lat. to 42° N lat. was not moved forward for final action in April, the consideration of changing or eliminating the non-trawl RCA will continue to be a high priority for stakeholders in the future. As depicted in Figure B-8, below, the non-trawl RCA completely closes the productive shelf fishing grounds, and greatly inhibits the ability to catch healthy and underutilized shelf stocks such as lingcod and mid-water rockfish from Washington to southern California.

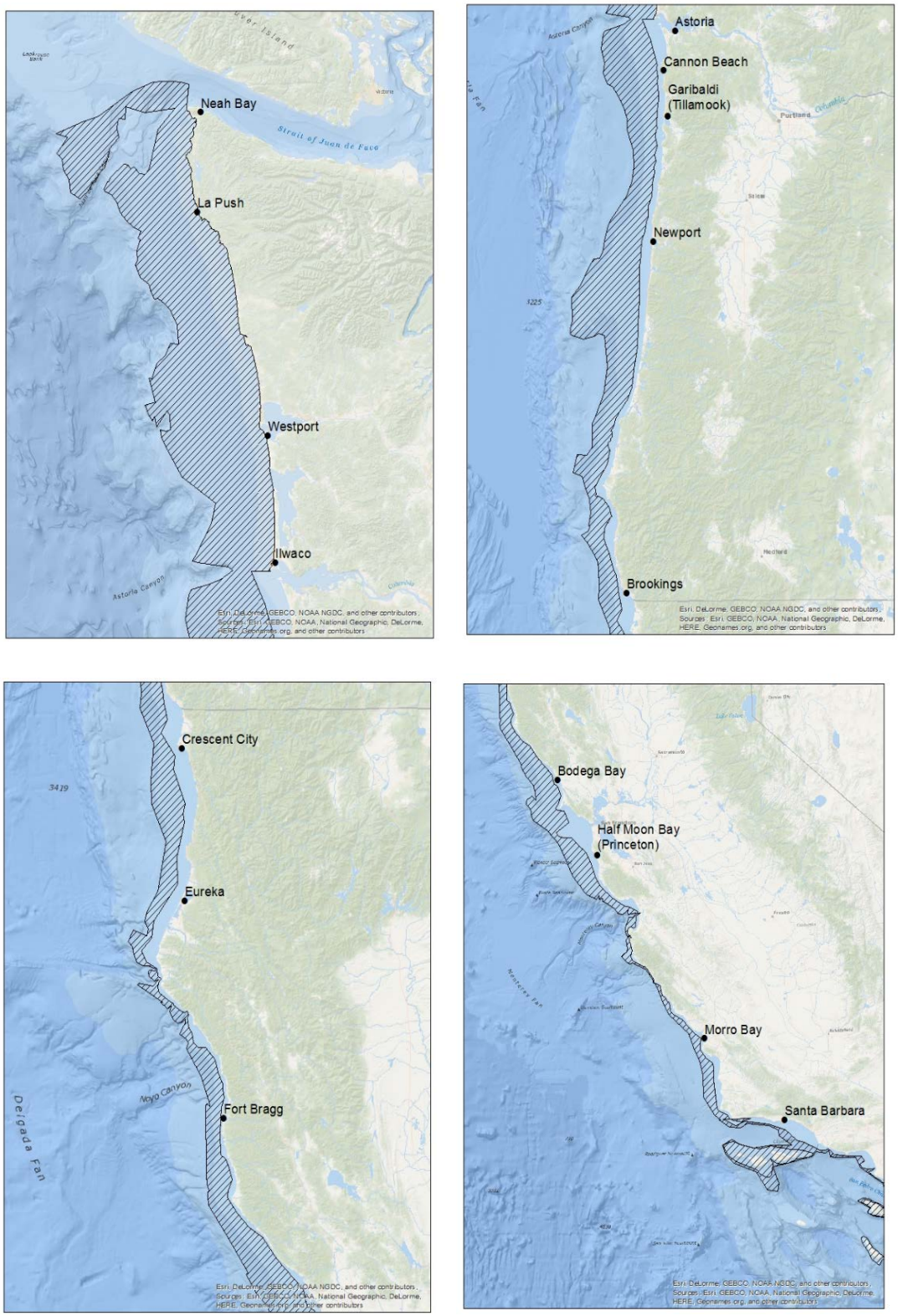

Figure B-8. Non-trawl RCAs off of Washington (top left), Oregon (top right), Northern California (bottom left) and Southern California (bottom right).

The non-trawl RCA (outlined in black in Figure B-8) has been closed to commercial groundfish since mid-2002 south of 40°10' N lat.[20] and since 2003 coastwide at various depths (see Appendix 3), resulting in limited bycatch data available to inform potential yelloweye rockfish impacts associated with re-openings. Any analysis would be informed by limited logbook, research, and EFP data and one year of WCGOP data.

Under No Action, there is likely little opportunity to consider changes to the non-trawl RCA north of 34°27' N lat. until the stock is rebuilt in 2027. In recent years, the non-nearshore fishery has seen increased bycatch of yelloweye rockfish (likely due to the stock rebuilding), with 0.8 mt taken in 2016. The nearshore fishery has seen variations in bycatch of yelloweye rockfish ranging from 0.6 to 2.2 mt since 2011 (Table B-8).

Table B-8. Nearshore (NS) and Non-Nearshore (NNS) Mortality (mt) of Yelloweye Rockfish, 2002–16 (Source: GEMM).

Sector	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
NNS	1.91	1.64	1.13	0.62	0.75	0.71	0.78	1.12	0.33	0.30	0.37	0.27	0.48	0.77	0.80
NS	0.03 a/	4.06 b/	0.89	1.30	0.69	1.65	2.27	0.42	0.11	0.73	1.81	2.16	0.69	1.53	0.63
Total	1.94 a/	5.70 b/	2.01	1.92	1.44	2.35	3.05	1.53	0.44	1.03	2.18	2.44	1.17	2.29	1.42

a/ WCGOP did not observe any nearshore fisheries in 2002, so this value represents only landed catch and no discards.
b/ WCGOP only observed the CA nearshore fishery in 2003, so discard estimates for the OR nearshore fishery are much more uncertain than in 2004–16.

Prior to the full implementation of the non-trawl RCA, the WCGOP did not observe any nearshore fisheries, although it did observe non-nearshore fixed gear fisheries. However, in 2002, the non-nearshore fishery had its highest yelloweye mortality in this year. Further, 2002 was also the year when lingcod and canary rockfish were overfished, so fishing opportunities were limited compared to other years, showing the potential for even larger amounts of yelloweye bycatch in future if the non-trawl RCA were opened.

While the Council did not move forward any proposed changes to the non-trawl RCA in the 2019–20 biennium, the considerations of changes could occur during the September 2018 omnibus discussions, as a stand-alone agenda item, or during the next biennial specifications package. Under No Action and status quo proportions, the total shares would not reach historical mortality maximums seen in 2003 (when the non-trawl RCA was in place) until 2021. Until the stock is rebuilt in 2026, the maximum buffer would be 0.8 mt in 2025. The nearshore fishery alone has seen variabilities of this magnitude in recent years. This also assumes that the off-the-top deductions remain the same as proposed in 2019–20, which is unlikely, which would likely further reduce the share to the sector under these proportions. With the limited amount of information available to inform bycatch projections within the non-trawl RCA, the variability that can be seen in the fisheries and in yelloweye rockfish bycatch, and the healthy target stocks with uncaught allocations, the likelihood of gaining any access to the non-trawl RCA appears to be limited under No Action.

However, under Alternative 1 or Alternative 2, the shares would be high enough to cover the 2002 mortality levels starting in 2021 (when the Council could first consider changes to the non-trawl RCA; Table B-9). With canary rockfish and lingcod both being rebuilt and underutilized, a small change in the

[20] Only sablefish, shortspine thornyheads, and slope rockfish was allowed outside of 20 fathoms. Flatfish can be taken within the non-trawl RCA with a #2 hook or smaller, and no more than 12 hooks per line.

boundaries would likely be considered rather than elimination of the non-trawl RCA; this would also provide a buffer for uncertainty in these areas where there is little information to inform bycatch. Moving forward, Alternative 1 would provide 15-16 percent more share to the fixed gear sectors, and Alternative 2 would provide 43-47 percent more per year than No Action.

Table B-9. LEFG and OA allocations based on status quo proportions.[a/]

Year	No Action			Alternative 1			Alternative 2		
	Non-Nearshore	Nearshore	Total	Non-Nearshore	Nearshore	Total	Non-Nearshore	Nearshore	Total
2019	1.1	3.2	5.3	1.6	4.6	6.2	2.0	5.8	7.8
2020	1.2	3.4	5.5	1.7	4.7	6.4	2.1	6.0	8.1
2021	1.2	3.5	5.7	1.7	4.9	6.6	2.2	6.2	8.3
2022	1.3	3.6	5.9	1.8	5.0	6.8	2.2	6.3	8.6
2023	1.3	3.7	6.0	1.8	5.2	7.0	2.3	6.5	8.8
2024	1.4	3.9	6.2	1.9	5.3	7.2	2.3	6.6	9.0
2025	1.4	4.0	6.3	1.9	5.4	7.3	2.4	6.7	9.1
2026	1.4	4.0	6.5	2.0	5.5	7.5	2.4	6.9	9.3
2027	5.1	14.4	19.5	2.0	5.6	7.6	2.5	7.0	9.4
2028	5.1	14.4	19.5	5.1	14.4	19.5	2.5	7.1	9.6
2029	5.1	14.4	19.5	5.1	14.4	19.5	5.1	14.4	19.5

a/ Note that rounding may affect total values.

Model results indicate the limited entry fixed gear (LEFG) and open access (OA) fisheries could require an additional 21 mt of yelloweye rockfish to fully obtain the unutilized northern lingcod and mid-water rockfish allocations (estimated to be worth $20.6 million in ex-vessel revenue, $35.6 million in personal income, and 2,205 jobs in Table B-10). The resulting ratios, such as +$1.69 million income per +1 mt of fixed gear (FG) yelloweye rockfish, were applied to the allocations (Table B-9) to project economic differences amongst the ACL alternatives (Table B-10). The main assumption is that benefits would begin accruing in future cycles (e.g., 2021-22), as the Council did not move forward any RCA changes or significant trip limit increases in 2019–20.

Alternatives 1 and 2 would provide higher economic benefits compared to No Action as the stock rebuilds, but all would converge in the years after the stock rebuilds (Table B-10, Figure B-9). The action alternatives spread the benefits over the rebuilding period and provide an additional 15.2 mt and 29.2 mt respectively between 2019 and 2026 with only one year of additional rebuilding time.

In contrast, No Action keeps the benefits low during the rebuilding years and then results in an earlier surge as the stock rebuilds a year or two faster than Alternatives 1 and 2, respectively. This sudden surge in allocations (e.g., 5.3 mt to 19.5 mt) may make it difficult for fishery managers to predictability adapt regulations to utilize the increase without unanticipated consequences. For example, it could resemble needing the full non-trawl RCA in one year and being able to possibly open it completely in the next year. With these concerns in mind, the Council and NMFS would presumably adopt a phased in strategy to slowly work upwards once the stock rebuilds, which would then delay access of potential benefits for No Action beyond what is predicted in Table extra FG shelf and Figure Cum shelf.

Table B-10. Potential additional economic activity related to increased access of underutilized FG shelf stocks (i.e., lingcod and mid-water rockfishes) constrained by yelloweye rockfish for each ACL alternative.

Year	No Action			Alt. 1			Alt. 2		
	Revenue	Income	Jobs	Revenue	Income	Jobs	Revenue	Income	Jobs
2019	0	0	0	0	0	0	0	0	0
2020	0	0	0	0	0	0	0	0	0
2021	0.4	0.7	42	2.3	3.9	242	4.0	7.0	431
2022	0.6	1.0	63	2.5	4.2	263	4.1	7.1	441
2023	0.7	1.2	73	2.6	4.6	284	4.4	7.6	473
2024	1.0	1.7	105	2.8	4.9	305	4.5	7.8	483
2025	1.1	1.9	116	2.9	5.1	315	4.7	8.1	504
2026	1.1	1.9	116	3.1	5.4	336	4.9	8.5	525
2027	14.9	25.8	1,596 [a/]	3.2	5.6	347	5.1	8.8	546
2028	14.9	25.8	1,596 [a/]	14.9	25.8	1,596 [a/]	5.2	9.0	557
2029	14.9	25.8	1,596 [a/]	14.9	25.8	1,596 [a/]	14.9	25.8	1,596 [a/]
Cum.	*49.6*	*85.8*	*5,303*	*49.2*	*85.3*	*5,284*	*51.8*	*89.7*	*5,556*

a/ It is unlikely that the transition to the rebuilt ACL would generate immediate growth in employment at this level (i.e., 1480 additional jobs created in one year in 2027 under No Action) and this value should be interpreted as an absolute upper bound on potential impacts.

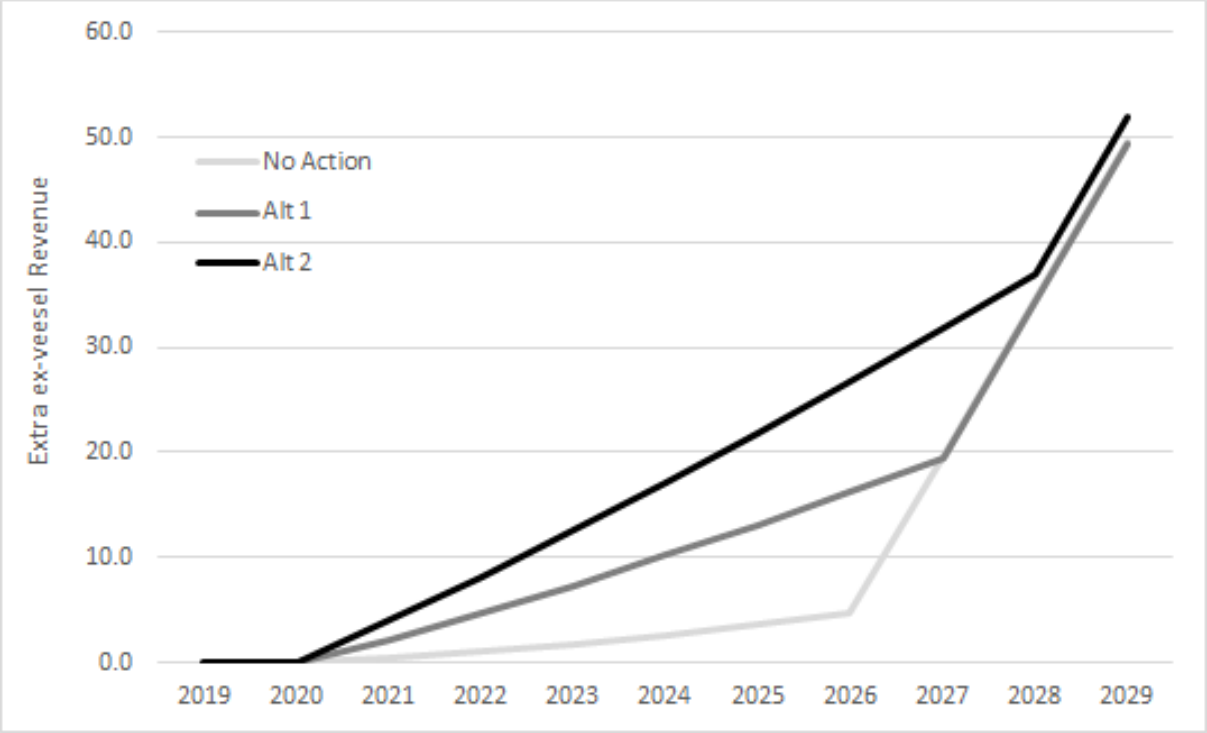

Figure B-9. Cumulative potential additional ex-vessel revenue related to increased access of underutilized FG shelf stocks (i.e., lingcod and mid-water rockfishes) constrained by yelloweye rockfish for each ACL alternative. The same patterns hold true for income and jobs.

B.5.2.3 Shorebased IFQ Needs and Impacts

Yelloweye rockfish mortality are expected to continue to increase as bycatch, in response to increased shelf and nearshore effort inspired both by the direct increase to the yelloweye allocation itself, and shelf and nearshore opportunities presented from the current high allocation levels of canary rockfish, which began in 2017.

For the 2019–20 biennial analysis, yelloweye rockfish was modeled using both bycatch and attainment-based methods during preliminary trials (Agenda Item F.2, Attachment 3, April 2018). In the end, the bycatch method provided a more responsive result and better fit to 2017 data, yet the projections were still relatively insensitive to changes in target species allocations. The bycatch rates for yelloweye rockfish seen in IFQ years (even since the 1990s) are extremely low and show little variation, and yelloweye rockfish encounters are very rare, which hampers the data's usefulness for forecasting. Additionally, changes in projected mortality of shelf target species drive the yelloweye rockfish projection, but the levels of allocations and projected mortality for aggregate shelf rockfish species were very similar among alternatives. This, coupled with the low level of variation in yelloweye rockfish catch throughout the 2011–16 reference data that inform the model, led to little differences amongst the alternatives.

To illustrate this phenomenon, although the shorebased IFQ yelloweye rockfish allocation was 42 percent higher on average for 2019–20 for Alternative 1 than for No Action, the projected mortality was only 0.24 mt for Alternative 1 in 2019 versus 0.23 mt for No Action in 2019, a difference of approximately 0.01 mt. Similarly, the yelloweye rockfish allocation was 82 percent higher on average for 2019–20 for Alternative 2 than for No Action, the projected mortality was only 0.24 for Alternative 2 in 2019 versus No Action in 2019, a difference of 0.01 mt. The difference was smaller than 0.01 between the projection under Alternative 2 and Alternative 1.

It is difficult to quantify how much additional access higher yelloweye rockfish allocations to the shorebased IFQ fishery would give to shelf and nearshore stocks. Modeling that question with current IFQ data has not given plausible answers thus far. Some exploratory, supplementary analyses were performed using a bootstrap simulation with yelloweye rockfish as bycatch and using lingcod and shelf rockfish as targets. Results suggested that the entire northern lingcod allocation could theoretically be taken at Alternative 1 levels of the yelloweye allocation. However, this result likely reflects a lack of relevant data from which to answer this question, particularly under the current yelloweye rockfish avoidance regime. It is plausible that there may be a threshold beyond which fishers would feel secure enough to pursue target strategies that pose a risk of catching significant quantities of yelloweye.

The potential change that would need to occur in the fishery may be a difference of kind rather than degree (or a step). In other words, fishing behavior would have to change to enable target strategies at shallow depths, which were previously ruled out under the extremely low yelloweye rockfish allocations in recent years. Landings time series show an extreme drop in yelloweye landings beginning in 2000. During the 1990s, landings ranged between 25 and 132 mt, and abruptly dropped to approximately 1 mt for two years, and then to less than 1 mt from 2002 forward. Thus, there are no catches to inform these types of questions in between the two regimes with intermediate catch ratios. However, it is logical that incremental increases in the allocation should yield access to additional target species catch.

During public comment and social survey interviews, fishermen have indicated yelloweye rockfish interactions constrain catch of chilipepper rockfish, lingcod, and Pacific cod in the shorebased IFQ fishery. These species are all under attained in the IFQ program, at 6 percent, 33 percent, and 4 percent, respectively in 2017. Chilipepper rockfish impacts are predicted to be 114 mt in the trawl sector in 2019 under each alternative, with the model reflecting a decreasing trend from 2013 to a low of 75 mt in 2016. As of mid-May 2018, quota pound usage indicates catch is already 141 mt for 2018, indicating a likely

return to the 2011–14 average of 300 mt (NMFS Vessel Account System), and potential growth opportunity relative to predicted impacts with increased access to limiting yelloweye rockfish. In a similar vein, the projected Pacific cod impacts for 2019–20 (similar to the 2017 observed catch) are 84 percent lower than the 2011–16 average, reflective of a current downturn in that stock expected to continue through 2020. This trend is predicted to reverse in 2021, meaning the potential benefits in Pacific cod attainment from expanded yelloweye access under Alternative 1 or 2 would likely occur in subsequent bienniums (Barbeaux, *et al.* 2017). After sablefish and petrale sole (both highly attained), lingcod was the highest price IFQ species in 2017, and with prices generally increasing since 2011, lingcod will likely be an appealing supplement to sablefish and petrale. Processors indicate that lingcod is considered a highly marketable fish for which demand would increase relatively quickly once harvest access is expanded. Similarly, current processing capacity would allow for increased utilization of chilipepper rockfish in central California and Pacific cod stocks in Washington. As these product regained customers after decades of limited access, expanded demand would likely result in processors adding additional processing lines and hiring more workers (Pers. communication, M. Okoniewski).

These opportunities may be needed as recent council public comment have cited concerns about decline in global sablefish prices, which bear out in available 2018 data. The high value sablefish fishery drives both the IFQ sector and economies of fishing communities that participate in the sector. PacFIN data through early-May 2018 show coastwide average prices at a ten year low, and down 25 percent in the IFQ sector relative to the 2011–17 inflation adjusted average. Landings of IFQ sablefish decreased 18 percent in Jan-April (the last month for which fish ticket data are available coastwide) relative to the same period for 2011–17. While this mid-season trends may reverse later in the year, any declines in the economically important sablefish fishery will place increasing pressure on alternate target species. With coastwide fishery opportunities diminished as described above, non-sablefish IFQ fishery opportunities will likely be of increased importance to trawl communities in the event sablefish declines continue.

B.5.2.3.1 Yelloweye Rockfish QP Trading, Opportunity, and Constraints

With the 2011 implementation of the catch share program, also referred to as the shorebased individual fishing quota (IFQ) program, yelloweye rockfish quota shares were allocated based on historic bycatch rates of target species. Of the 129 original quota share permits issued, 124 had some yelloweye rockfish issued, which in the first year of the program translated to 1-2 quota pounds (QP) for 36 percent of permit holders, 4-18 QP for 52 percent, 20-41 QP for 7.3 percent, and 60-80 QP for 4 percent, with the largest share amounting to 101 QP for one permit. The median account had four quota pounds issued in 2011. At the time, participants worried the low allocations for overfished species would constrain attainment of allocated target species quotas because of low overall sector allocations and possible “hoarding” of pounds by owners as insurance for their own unforeseen catches. With many vessels received a small share of the initial allocation, this hoarding appears to have occurred throughout the first seven years of the program, with minimal trades of quota pounds between vessels, discussed further below (Table B-11).

Table B-11. Yelloweye Rockfish Individual Fishing Quota Pound Trading and Usage.

Year	Number of Reported Trades	Average QP price	Ratio of QP Prices to Ex-Vessel	YEYE Catch (lbs.)	Ratio of Uncaught QP to Allocation
2011	4	$32.38	60.43	128	90%
2012	9	$21.76	41.24	76	95%
2013	11	$29.58	52.32	139	94%
2014	12	$27.07	43.15	123	95%
2015	4	$19.86	35.11	78	97%
2016 [a/]	1	$15.00	37.19	108	96%
2017	11	$13.30	20.86	367	86%

a/ Data from Jefferson State Trading Company's publicly available quota pound auction price table. All other data are from trades reported to NMFS with price data as recorded on the vessel account page.

With an annual vessel QP use level of 11.4 percent of the trawl allocation, in the first year of the program, a tow with 151 pounds of yelloweye would have required a vessel to sit out the remainder of the season. Depending on the time of year and flexibility of the vessel/processor to substitute alternate fisheries for the planned season catch, being shut out of the fishery after meeting or exceeding an annual use cap could leave a business unable to meet financial obligations, such as any debt payments in what is often a highly leveraged enterprise. In more than seven years of the IFQ program, zero vessels[21] have exceeded the yelloweye rockfish vessel cap, and sector wide quota pound usage has remained around 10 percent. A number of participants discussed shifting fishing practices drastically (i.e., completely avoiding targeting certain species, staying away from certain fishing spots as a result) for fear of yelloweye rockfish catch. Low usage and avoidance behavior may reflect overweighting of the small probability of a tow that would exceed the annual vessel limit, a widely observed decisional structure in behavior economics where the probability of rare events are overestimated and potential losses weighted more than gains (see for example, Burns et al. (2010)). This risk avoidance appears likely to be persistent—in 2018, the annual vessel use limit is 276 pounds, an 82 percent increase over the 2011 limit, yet attainment of yelloweye rockfish restricted stocks (e.g., lingcod) remains constant, with avoidance continuing to remain a large concern to trawlers (Agenda Item E.7.a, Community Advisory Body Report 1, September 2017). The annual yelloweye rockfish vessel limit would increase to 477 under No Action, a 72 percent increase over the 2018 limit. Behavioral responses to a similarly scaled increase in the first seven years of the program indicate that this would likely not provide a sufficient reduction in perceived risk, and thus would be unlikely to change fishing behavior enough to increase attainment of the underutilized stocks described above. The vessel limit would increase to 678 pounds under Alternative 1, and 854 pounds under Alternative 2, with the additional 201 and 377 pounds respectively serving as a "buffer" against the estimated risk of exceeding a limit and subsequent financial consequences.

Catches for many of these "bycatch" species tend to be rare, highly uncertain, and concentrated, creating the potential for mismatches between allocations and catches and the need to redistribute and aggregate dispersed QP holdings (Holland and Jannot 2012). As shown in Table B-12, the mean haul from 2012–16 contained less than two fish. However, there has been a low volume of trades since 2011, with vessels worried that in the low-probability event they encounter yelloweye rockfish, they won't be able to acquire the quota pounds needed to cover the catch at any price, shutting them out for the remainder of the

[21] For reference, in 2011 90 vessels participated in the non-whiting trawl fishery, this number declined each year to 53 in 2015 (Five Year Review).

season. For example, in 2011 only 14 vessels caught any yelloweye rockfish in the IFQ fishery, while QP was dispersed to over 120 vessel owners (Holland 2016).

Table B-12. Mean values for WCGOP-observed yelloweye rockfish catch from 2012 to 2016 by gear. Midwater gears landed yelloweye rockfish shoreside so are not shown here.

Catch Shares Gear	Mean YEYE Fish per Haul when Encountered	Mean YEYE lbs. per Haul when Encountered	Total Observed Count (# of fish)	Total Observed Weight (lbs.)	Mean Observed YEYE lbs. for Individual Fish
Bottom Trawl	1.3	3.5	146	402.15	2.75
Hook & Line	1.2	7	6	35	5.83
Pot	1.3	5.75	5	23	4.6

This tendency to "hoard" QPs changes the expected cost of yelloweye rockfish bycatch and puts a damper on the market. At an average $25/lb., the market value of pounds sitting in accounts at the end of the year is less than $5,000 for the top quota pound holders, and much lower for the average vessel. The perceived opportunity cost of having to shut down operations for the year in the event of a high bycatch event likely exceeds this cost. Lingcod and yelloweye rockfish prefer similar habitats, generally staying in rocky areas but occasionally intermingling in flat, muddy areas trawlers typically target to avoid bycatch.
Public comment responses frequently confirm that yelloweye rockfish is the primary obstacle to lingcod access.

Thus for most account operators, the insurance of yelloweye rockfish quota pounds appears to outweigh the opportunity cost of holding on to them, particularly as a portion of uncaught pounds "carryover" from year to year.

As the availability of quota increases, this risk calculation may change, and as discussed above, transfer costs may decrease. The trawl sector allocation would increase from baseline 1.1 mt allocation to 1.9 under No Action, with an additional 0.5 mt available under Alternative 1 and a further 0.7 mt under Alternative 2. Under the current allocation structure, the trawl allocation of yelloweye rockfish would range from 1.9-2.3 over 2019–2026 under No Action before reaching the rebuilt level of 8.2 mt in 2027. Alternative 1 would range from 2.6-3.2 over 2019–2027 before reaching the rebuilt level in 2028. Alternative 2 would range from 3.3-4.1 over 2019–2028, with the stock predicted to rebuild in 2029 (Table B-13).

Table B-13. Trawl allocations based on status quo proportions.

Year	No Action	Alt. 1	Alt. 2
2019	1.9	2.6	3.3
2020	1.9	2.7	3.4
2021	2.0	2.8	3.5
2022	2.1	2.9	3.6
2023	2.1	3.0	3.7
2024	2.2	3.0	3.8
2025	2.3	3.1	3.9
2026	2.3	3.2	3.9
2027	8.2	3.2	4.0
2028	8.2	8.2	4.1
2029	8.2	8.2	8.2

Increases in trawl allocation may result in improved functioning of the quota pound market and increased volume of yelloweye rockfish trades, allowing for a more aggressive fishing strategy and likely increased attainment of co-occurring target species stocks. With the large number of uncaught quota pounds each year, it is unlikely the increased availability of quota pounds under No Action relative to the Baseline (2017) will increase usage or trading. In 2013–14 there was a similar increase, when the annual average yelloweye rockfish trawl allocation increased about 71 percent compared to 2011–12, yet catch only increased 28 percent. Trading volume did not increase substantially relative to the number of trades for other species despite the availability of additional pounds. Therefore, the similarly scaled 72 percent quota pound increase under No Action from 2017-18 may not be sufficient to jump start the trading market over current levels, and thus would not be expected to substantially increase catch of either yelloweye rockfish or target species currently restricted by lack of access to yelloweye rockfish pounds. Table B-14 percentages and Figure B-10 below provide an estimate of the distribution quota pounds that would be distributed to individual accounts based on current share ownership ratios. The 145 percent increase under Alternative 1 would likely provide some increased assurance to all quota share permit holders who operate vessels. About 120, or three quarters of account holders would able to cover catch of two average sized fish under Alternative 1, and three under Alternative 2, which offers a 209 percent increase to the median account holder.

Table B-14. Quota pound percentages.

Quota Share Account Owners	Quota Pound Allocations			
	SQ	**NA**	**1**	**2**
25 percent of accounts receive less than or equal to	2	5	7	8
50 percent of accounts receive less than or equal to	8	14	19	24
75 percent of accounts receive less than or equal to	23	41	58	73
Average account increase from SQ	--	87%	170%	235%
Accounts receiving pounds [a/]	n=116	n=117	n=119	n=120

a/ As harvest guideline increases, owners of small percentages will start receiving allocation, which are issued as whole quota pounds. Because of this change in n, about 29-30 quota share owners fall into each category listed above.

Under the No Action Alternative, about 20 percent of yelloweye quote share owners (23 permits) would not have enough quota pounds allocated to cover catch of one average yelloweye rockfish observed in bottom trawl fisheries (about 3 pounds, Table B-12 above). In Alternative 1, an additional 12 accounts would have enough pounds for one of the typical yelloweye rockfish hauls observed, with two more owners able to under Alternative 2. About 40 percent of accounts would not have enough to cover two fish under No Action, with the mean haul containing 1.3 fish when present. Under Alternative 1, an additional eight accounts could cover catch of two fish, and another five under Alternative 2. Lastly, in Alternative 2, three quota share owners with shares below 0.01 percent would receive one quota pound each, as compared to No Action, where they would receive 0 pounds. In Alternative 1, two of these owners would receive one pound.

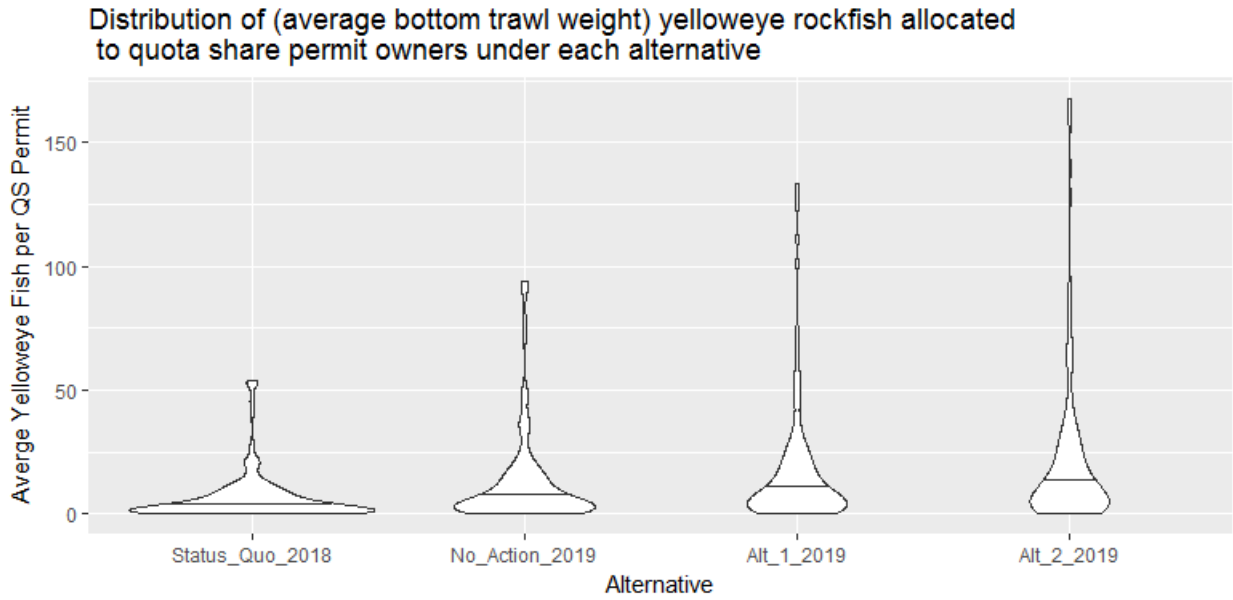

Figure B-10. Estimated distribution of 2019 quota pound distribution to quota share owners under each alternative, in terms of the average (2.75 lb.) bottom trawl-caught yelloweye rockfish that could be covered. (Based on May 2018 QS ownership percentages).

Overall, the benefits of Alternative 1 and 2 compared to No Action are summed up in the GAP April 2018, report:

> It is important to note that the precautionary increase under Alt. 1 would not create new opportunities or reinstate old, pre-IFQ, opportunity. Any increase would simply allow more flexibility. Additional fish in the catch shares program would free up the flow of quota in the market. Fishermen tend to hold on to any yelloweye quota for most of the year in order to cover potential interactions with yelloweye during season. The assurance of more yelloweye quota will allow trawlers an easier avenue to cover potential overages, thereby creating more quota trading. In short, it would allow the IFQ system to work the way it was intended. More yelloweye could provide increased access to other species and areas. For example, Dover sole is found on both the shelf and slope, but Dover caught on the shelf are better quality. Trawlers are hesitant to fish the shelf due to potential yelloweye bycatch. Yelloweye quota increases could allow some exploratory fishing on the shelf, giving fishermen some assurance they could cover any potential yelloweye overage while obtaining better quality fish for the market. Any fishing effort on the shelf would remain governed by strict IFQ management that is conservative by nature.

B.5.2.3.2 Changes to the RCA

In April 2018, the Council recommend the removal of the trawl RCA off the coasts of Oregon and California as part of Amendment 28 to the FMP. In the last years for which data are available on catch in the RCA, average annual fleetwide landings of yelloweye rockfish in the trawl RCA were 412 pounds and 327 pounds in California and Oregon, respectively, for a total of 895 pounds in 2000 and 444 pounds in 2001. These yelloweye rockfish catches were associated with millions of dollars in ex-vessel revenue for target species. The Council concurrently selected a spatial management system referred to as “Block Area Closures” that could be used (among other conservation reasons) to close high bycatch areas for yelloweye rockfish (EFH/RCA EIS, pg. 2-28), meaning unforeseen yelloweye rockfish catch could potentially limit access to the newly reopened opportunity. Under the No Action alternative, if the barriers to quota pound trading discussed above continue, IFQ market inefficiencies will likely limit the extent to which the bottom trawl fleet will be able to fish inside the trawl RCA areas that the Council recommended be reopened in Amendment 28. However, there may be enough of an increase in the overall quota pounds available under Alternative 1, and in particular Alternative 2, to allow for more activity within the trawl RCA that that the Council recommended for reopening in Amendment 28. With sablefish and petrale sole already highly attained, benefits from reopening would largely result from increased attainment of Dover and English sole, along with widow rockfish, minor shelf and slope rockfish, Ultimately though, it will depend on processors ability to redevelop long diminished markets for these products along with harvesters ability to target these species while avoiding bycatch of constraining species. In addition, while changes to the trawl RCA off Washington were not part of the Amendment 28 final preferred alternative, the additional yelloweye rockfish under Alternatives 1 or 2 may allow for future consideration of changes. As shown below in Figure B-16 and Figure B-20, areas within the trawl RCA have a significant amount of rocky reefs, which is good yelloweye rockfish habitat.

B.5.3 Recreational Fisheries

Yelloweye rockfish management has led to several closures in recreational sectors since 2011, resulting in negative economic impacts on coastal communities in Washington, Oregon, and California. Additionally, as opportunities to fish for salmon have been reduced, communities have increasingly relied on groundfish to fill the void. For perspective, the preliminary number of vessel-based ocean salmon recreational angler trips taken on the West Coast in 2017 was 174,500, 27 percent below the number of angler trips taken in 2015, 35 percent below the 2012–16 average of 270,400, and 71 percent below the

1979–90 average of 599,700 angler-trips per year. With this effort shifting into the groundfish fisheries (Figure B-11), it would be increasingly beneficial to provide stable recreational opportunities.

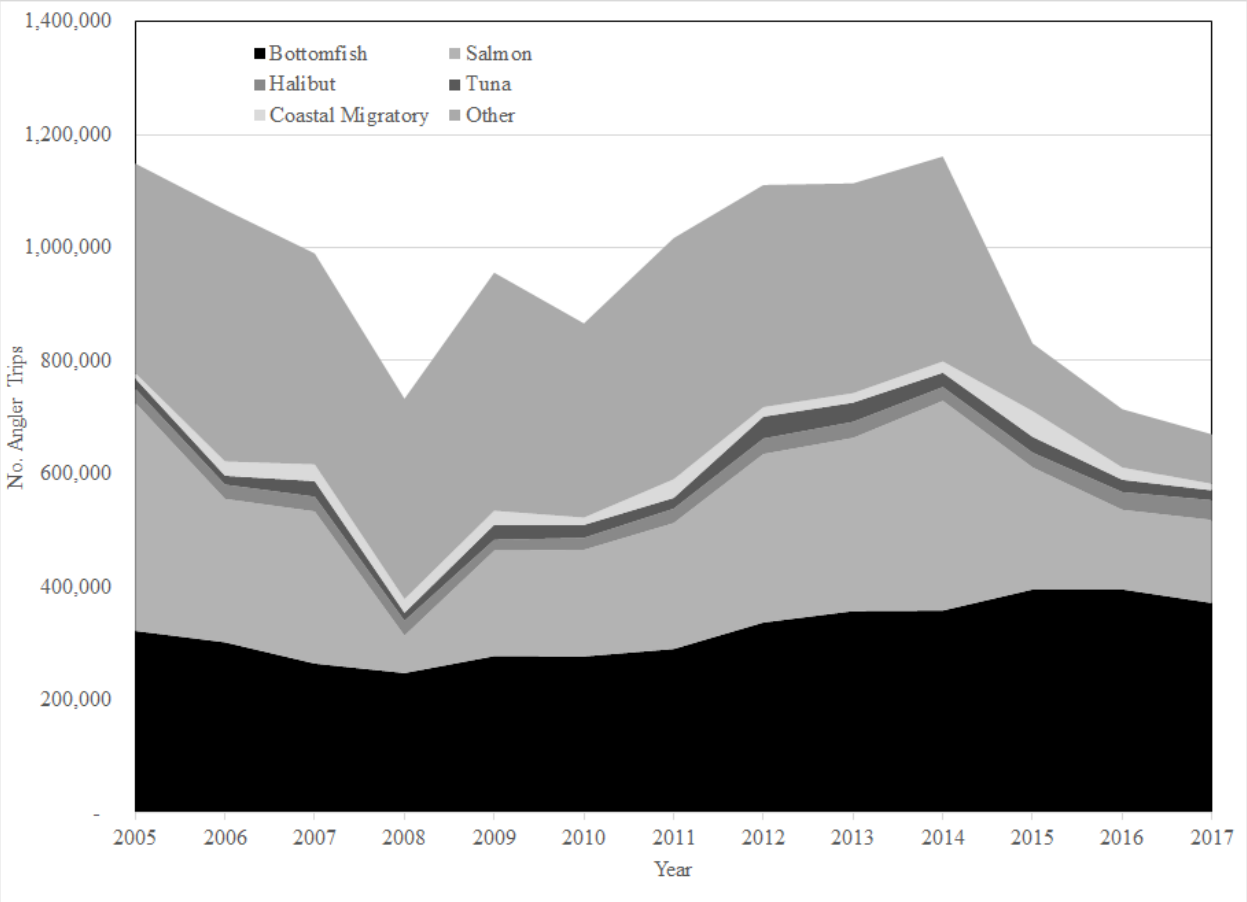

Figure B-11. Number of angler trips by trip type and year for Northern California, Oregon, and Washington 2005–17. Complete estimates are not available prior to 2005.

At the same time that access to fishing opportunities have diminished in many other target fisheries and closures and restrictions have impacted all major recreational groundfish sectors described above, the population of California, Oregon, and Washington have increased by about 6.6 percent from 2010–17, or about 3.2 million additional residents (U.S. Census Bureau). With poor forecasts for salmon stocks in the foreseeable future, increasing interest in recreational activity by a growing population will likely put additional strain on groundfish recreational fisheries in the coming years in all three states.

Depth restrictions, seasonal, and area closures are tools used to minimize encounters with yelloweye rockfish in recreational fisheries in Washington, Oregon and Northern California. Under the No Action Alternative, some changes that reduce depth restrictions or other measures might be possible. However, with increasing reliance on groundfish fisheries, and uncertainty in expected effort and encounters with the rebuilding yelloweye rockfish stock, additional yelloweye rockfish available under Alternatives 1 and 2 will provide a necessary buffer to reduce the need for inseason action (including potential closure) and create fishery stability. In public testimony at state hearings and Council meetings, recreationally focused communities (e.g., Neah Bay, La Push, Garibaldi, Brookings, Winchester Bay, and Coos Bay, as well as California communities north of Pt. Conception) have reported negative economic impacts from closures

to the recreational groundfish fishery, with charter operations, bait and tackle shops, marine fuel, and service industry businesses laying off staff and, in some cases, closing their businesses prematurely.

There are several sources of uncertainty with regard to projected impacts for yelloweye rockfish surrounding available data. As described above, retention of yelloweye rockfish has been prohibited in recreational fisheries since 2002 and significant depth restrictions have been in place since 2003. Therefore, the data available for estimating projected impacts of removing depth restrictions, relies on data when depth restrictions were not in place which is over fifteen years old. Additionally, the yelloweye rockfish stock had just been declared overfished in years prior to depth restrictions and applying those encounter rates to the fishery in 2019 and beyond when yelloweye rockfish is within ten years of rebuilding could result in underestimated projected impacts (e.g., the "rebuilding paradox" as discussed previously). This not only suggests that the additional yelloweye rockfish under Alternative 1 and 2 would help to buffer against that uncertainty, but that additional information could be gathered from future EFPs, which have been limited under the 2011 rebuilding plan. This data would likely help stakeholders and managers better understand what current encounter rates are when considering opening areas that have been closed for many years. As discussed above with the fixed gear commercial fishery, there is likely to remain little opportunity for EFPs throughout the rebuilding period under the No Action Alternative with proposed No Action management measures leaving little room for uncertainty. However, the additional yelloweye rockfish available under Alternative 1 and 2 would provide more opportunity for stakeholders to propose and the Council to consider EFPs in the future.

B.5.4 Washington Communities

Washington is unique among the three West Coast states in that it has tribal groundfish fisheries in addition to commercial and recreational. Fisheries that target groundfish are highly constrained by yelloweye rockfish which are more prevalent in rocky reef habitat (Figure B-12). Yelloweye rockfish abundance and habitat becomes progressively less/lower from north to south along the northern portion of the Washington coast. As such, management restrictions on recreational fisheries are generally more extreme in the north where yelloweye rockfish encounters occur at a higher rate and commercial fisheries, tribal and non-tribal, are limited in their activity. The need to minimize yelloweye rockfish is the primary driver of management measures across all non-whiting groundfish fisheries in Washington.

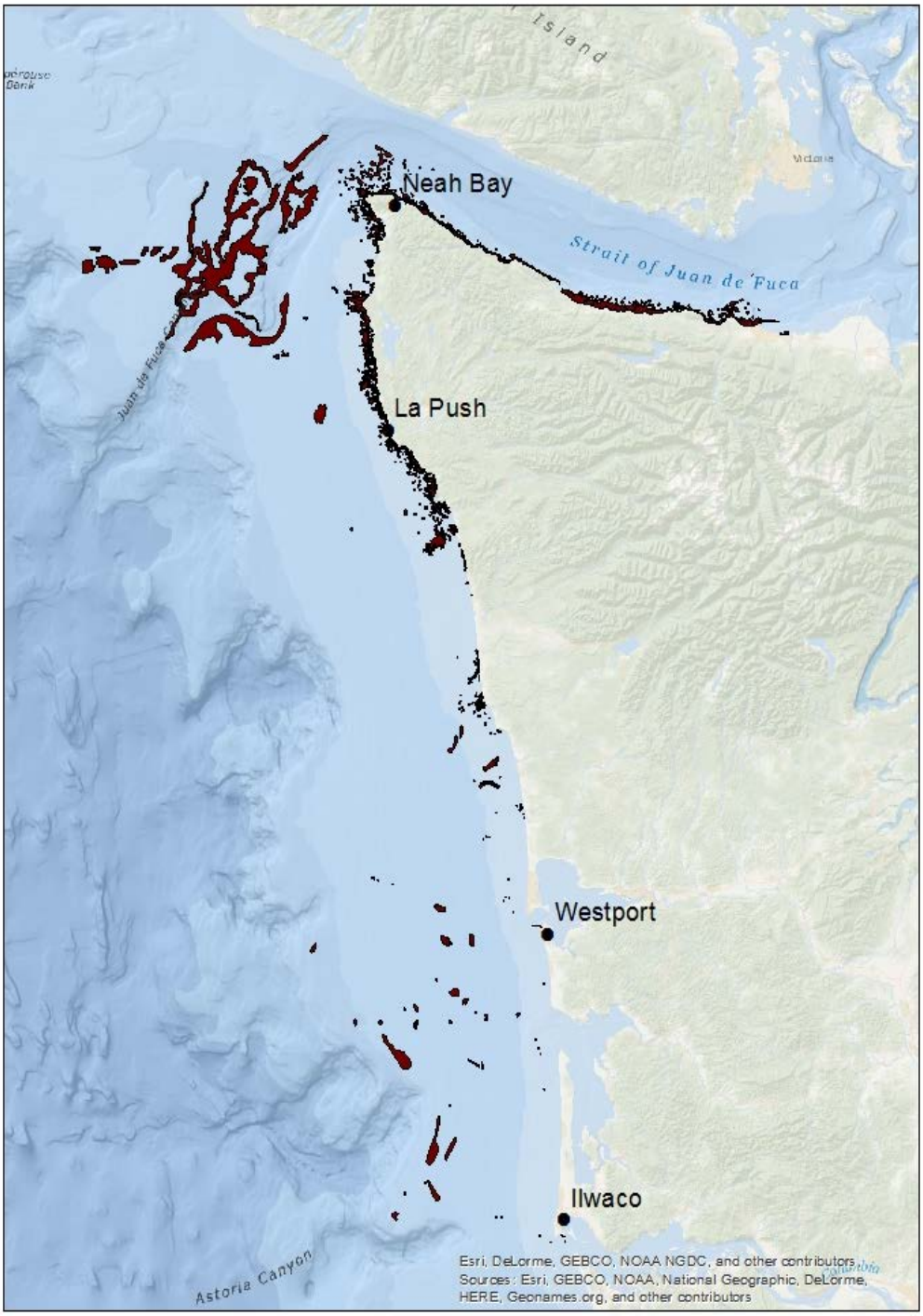

Figure B-12. Map of rocky reefs off Washington.

To reflect the difference in habitat type, fisheries are managed in three regions that correspond to yelloweye rockfish abundance. The North Coast region includes the ports of Neah Bay and La Push and includes landings into Puget Sound for commercial fisheries. The South Coast region includes the ports of Westport and Taholah. Washington and Oregon commercial and recreational fisheries are combined for the Columbia River area which includes the ports of Ilwaco and Chinook in Washington and Astoria,

Hammond, and Warrenton in Oregon. As shown in Table B-15, Washington coastal communities are almost all highly dependent on recreational and commercial fisheries, and are vulnerable to changes.

Table B-15. Vulnerability and dependence in Washington fishing communities.

Community	Social Vulnerability	Recreational Dependence	Commercial Dependence
Bellingham , WA	Moderate	High	High
Neah Bay, WA	High	High	High
La Push, WA	High	Moderate	High
Taholah, WA	High	Low	No Data
Westport , WA	High	High	High
Chinook, WA	Moderate	High	High
Ilwaco , WA	High	High	High

(Source, Karma Norman/NWFSC Human Dimensions Program)

Commercial fisheries in Washington harvest a variety of species, from Dungeness crab to Pacific halibut to Pacific whiting, off the West Coast, Alaska, Canada, and Puget Sound. Yet, the declines in non-groundfish fisheries described coastwide above are largely evident in Washington fisheries. In 2017, 58,600 ocean salmon angler trips were taken on vessels on the Washington coast, 27 percent below the recent five-year (2012–16) average of 80,900. The $2.9 million ex-vessel value of Washington's 2017 non-Indian salmon troll harvest was in line with the 2012–16 average value of $2.7 million. The 2017 value was 66 percent below the 1979–90 inflation-adjusted average of $8.6 million (2017 Salmon SAFE). The state of Washington CPS landings totaled 215 mt generating $70,558 (in 2016 US$) of revenues in 2016. For Washington revenues, this was a 31 percent decrease from 2015, and a 99 percent decrease from the 2011–15 five-year period (2017 CPS SAFE).

Unlike Oregon and California, Washington closed its commercial nearshore fishery in state waters in 1995 to preserve recreational fishing opportunities, and minimize localized depletion. At the time, managers felt that nearshore stocks, shared by both commercial and recreational sectors, couldn't provide long term economic benefit to both sectors without negative impacts to the resource. WDFW made a policy decision to prioritize nearshore groundfish resources for the primary benefit of recreational fisheries. Managers considered recreational groundfish the "bread and butter" of recreational fisheries, and wanted to preserve it in order to provide Washington recreational anglers alternative fishing opportunity when other fisheries, such as salmon, might be constrained. State waters were also closed to commercial trawling in 1999.

B.5.4.1 North Coast

Commercial

North Coast ports, specifically Neah Bay and Bellingham, are unique in that they have participants and landings from the Pacific Coast, as well as Alaska, Canada, and the Puget Sound. Since the implementation of the current yelloweye rockfish rebuilding plan in 2011, the Puget Sound region (including Bellingham) has lost 58 commercial fishing vessels and 18 buyers; the North Washington Coastal group (including Neah Bay) has lost 27 vessels and 4 buyers. While groundfish does not make up

a large portion of the total revenue in recent years, it is the access to healthy target stock under Alternative 1 or 2 that could provide relief in the long term when other fishing opportunities are reduced or not available. Puget Sound fishing communities get about 50 percent of their combined ex-vessel revenue from Dungeness crab, which are one of the most susceptible species to climate change (Ecosystem Initiative Webinar, February 27; Figure B-13). These communities have only been able to maintain the recent levels of overall income due to crab and salmon, and to a degree, other species, in the North Washington Coast (Figure B-14). If 2012 conditions were to arise again in the Puget Sound, Alternative 1 or 2 would provide the opportunities to keep these communities rebuilding from the downtowns of the overfished era.

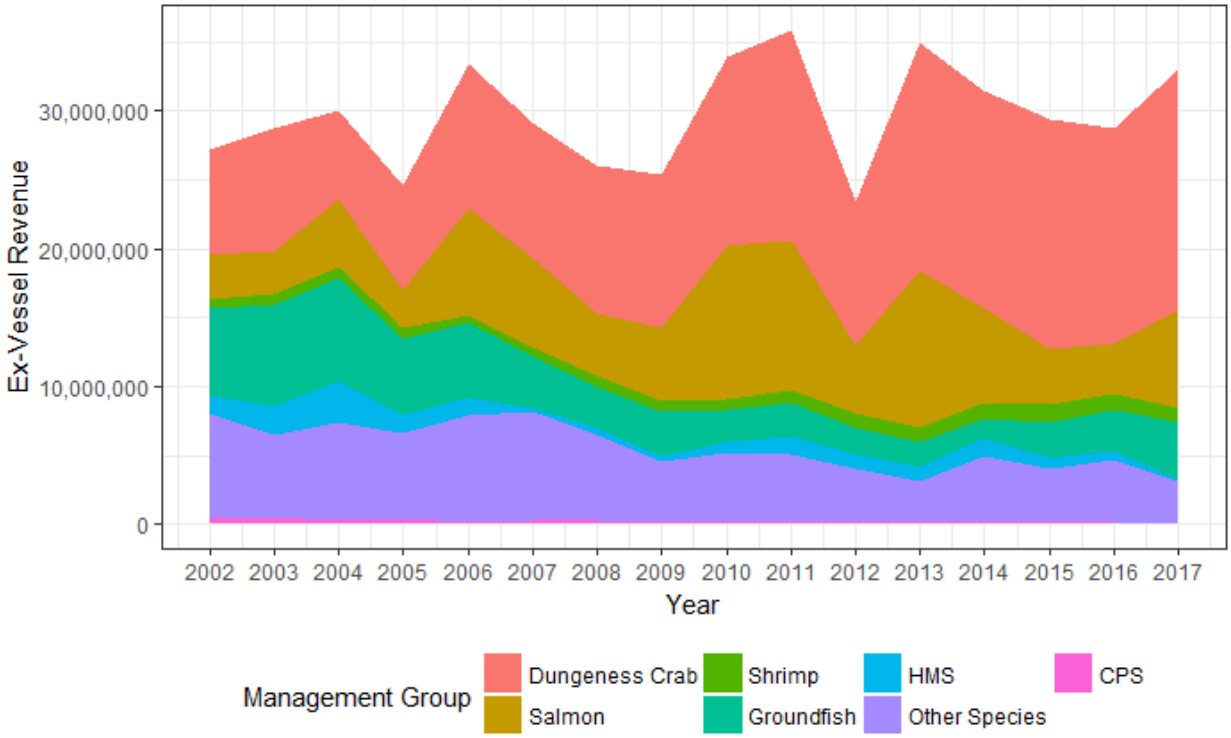

Figure B-13. Proportion of ex-vessel revenue in Puget Sound ports by management group.

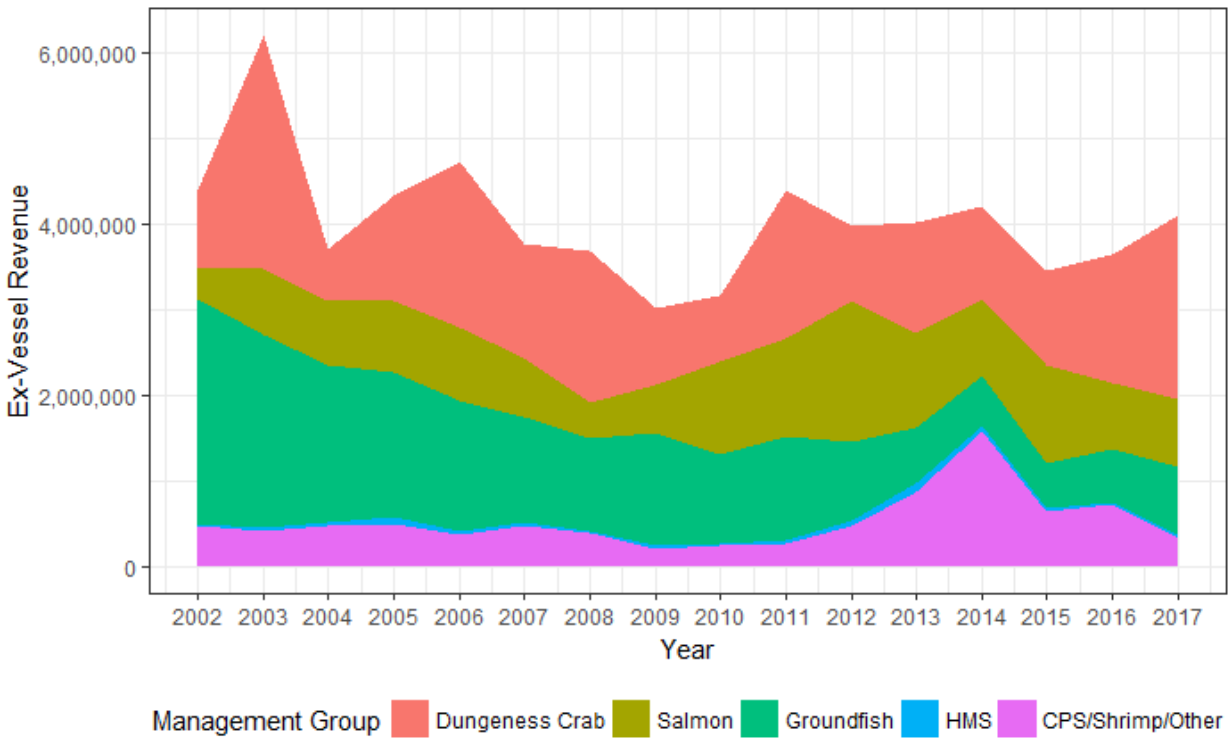

Figure B-14. North Coast Ex-Vessel Revenue from Shoreside Fisheries.

By 2011, these groundfish communities were already vulnerable due to the non-trawl and trawl RCA and the consolidation of the fleet due to the limited entry and buyback program. Bellingham was even identified as one of the three remaining active groundfish trawling ports in Washington in the Five-Year review. In 2007, the area north of Cape Alava was closed from shore to 100 fm for non-tribal bottom trawling due to high bycatch of canary and yelloweye rockfish, which limited most commercial activity outside of 100 or 150/200 fm on the North Coast (Figure B-15).

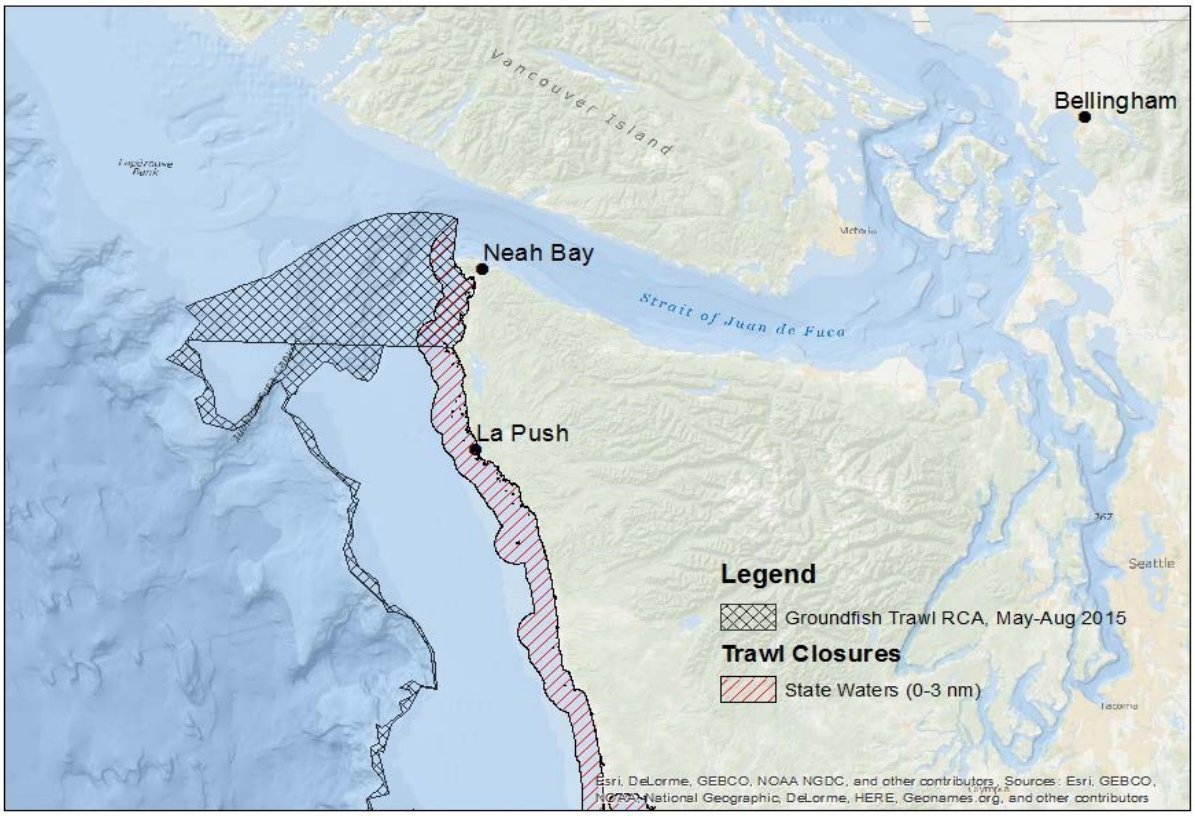

Figure B-15. Trawl RCA Configuration prior to reopening in 2017 off Cape Alava, May-Aug. For complete history and depths throughout the year, see Appendix 2.

At the time of the Cape Alava closure, the Puget Sound region had already lost three buyers and both areas had lost seven groundfish active vessels from 2002. The proportion of total revenue from coastal groundfish (all from the non-whiting sector) had decreased by five percent in the Puget Sound, with overall groundfish revenue declining by half. The North Washington Coast saw the proportion of coastal groundfish revenue (all from non-whiting sector) going from 55 percent down to under 32 percent. This decline in revenue from groundfish continued and in 2014, coastal groundfish made up just 4.4 percent of the total revenue in the Puget Sound and only 13.6 percent on the North Washington Coast. In addition, the North Washington Coast continued to lose groundfish vessels, with 25 fewer vessels landing into the ports and nine of those since 2011.

Trawl Opportunities

With the rebuilding of canary rockfish in 2015 and the individual accountability provisions of the IFQ program, the Council reopened the area shoreward of 100 fm north of Cape Alava and from 150–200 fm to non-tribal bottom trawling through the 2017–18 biennial process. During that time, the Puget Sound and Northern Washington Coast regions saw groundfish landings decrease to approximately 40 percent and revenue to 59 and 53 percent, respectively, of 2006 (pre-closure) levels in 2016. While there has been some resurgence of activity since 2015 with widow and canary rockfish rebuilding and the area opening up to trawling in 2017, there still are concerns with bycatch of yelloweye rockfish in the areas outside the trawl RCA (Figure B-16).

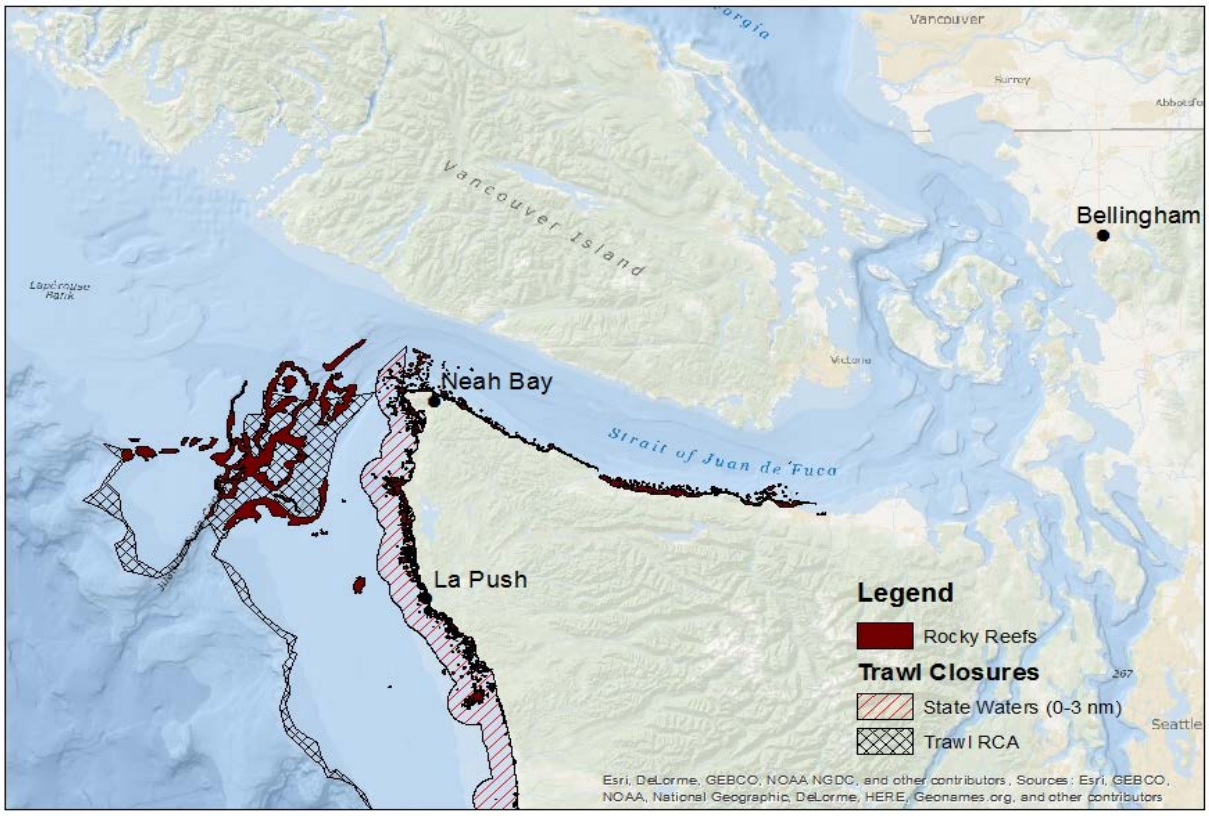

Figure B-16. Trawl RCA configurations for the North Washington Coast.

Out of about 1,200 WCGOP observed bottom trawl hauls in this area prior to closure, 8.3 percent were positive for yelloweye (or about 1 in 25 hauls), with those positive hauls having an average of 5.7 pounds of yelloweye to up to over 40 pounds. For perspective, based on QS holdings in 2018, under No Action the median QS owner (with yelloweye rockfish QS) would receive 14 initial quota pounds compared to 19 under Alternative 1 and 24 under Alternative 2. If this area sees a resurgence in activity, a vessel could need to acquire quota after approximately 50 to 75 individual hauls (assuming 1 in 25 hauls is positive for yelloweye at 5.7 pounds per positive hauls). This compares to over 75 hauls under Alternative 1 and over 100 hauls under Alternative 2. Since 2011, the average number of hauls made by bottom trawling vessels north of 40°10' N lat. has been 125, with a median of 85. While it is likely that only a portion of the actual hauls would occur in this area, it does provide a sense of the likelihood of needing to access more quota if fishing in this area under each Alternative. As described above, the available quota under Alternative 1 or 2 may be enough to jump start the quota market and provide more insurance for vessels who want to operate in these high yelloweye bycatch areas.

However, with the consolidation of quota, vessel, and permit ownership moving away from this area in the past decade, increased trawling off the Washington coast within the recently reopened area will be limited by the extent to which returning or new entrants are able to acquire yelloweye quota from current owners. As discussed above, an increase in the availability of quota shares or pounds on the market is more likely under Alternative 1, and particularly under Alternative 2, where the IFQ allocation is almost more than double the current allocation, which would likely alleviate concerns among current owners about lightning strike insurance.

Non-Trawl Opportunities

The non-trawl RCA will remain the primary constraint for accessing underutilized shelf species, such as lingcod and spiny dogfish for the North Coast ports (Figure B-17). As shown, the area closes off a large portion of yelloweye rockfish habitat off the northern coast of Washington. While the impacts to yelloweye rockfish by moving the boundaries of the non-trawl RCA are uncertain, there are considerable potential benefits to these communities.

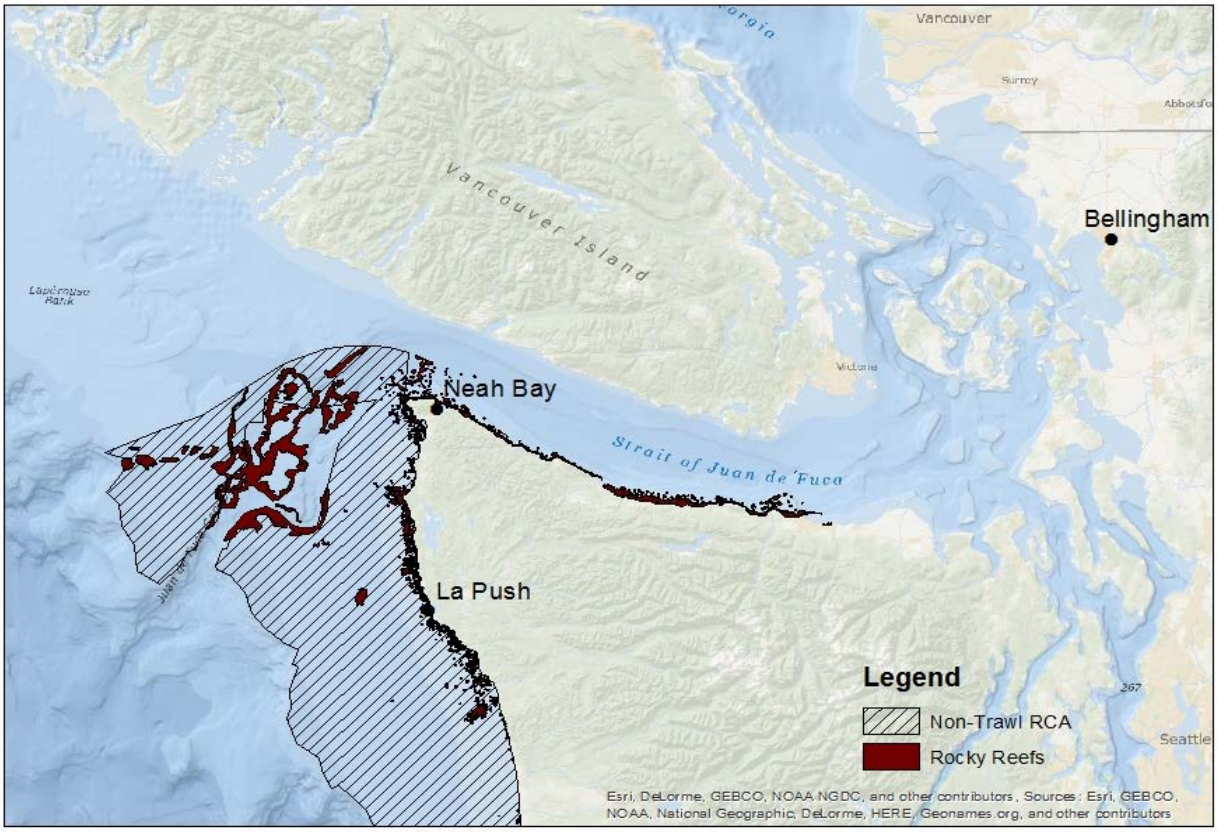

Figure B-17. Non-trawl RCA for the Washington north coast.

As an example, Bellingham used to be a primary port for deliveries of spiny dogfish shark. Spiny dogfish, one of the leading substitutes for cod and in high demand in Europe for fish and chips, were primarily harvested within 100 fm. With the implementation of the non-trawl RCA, there was a decline in landings eventually resulting in the primary buyer closing. In 2017, only 37 percent of the ACL was attained and the trip limits for fixed gear are set at levels that could allow a limited entry or open access participant to harvest 850,000 pounds within a year, which could significantly benefit these entrants that likely participate in multiple fisheries (e.g., crab, salmon, pink shrimp). If the non-trawl RCA were to open, or even move in seaward from 100 fm, there could be opportunity to harvest this highly underutilized species. However, as described above in the fixed gear impacts summary, there is limited opportunity under No Action until 2027 (when the stock is rebuilt) to consider substantial revisions to the non-trawl RCA. A change in the rebuilding plan to Alternative 1 or 2 would provide the opportunity for EFPs and research within the non-trawl RCA to assess yelloweye rockfish bycatch risk and potentially move the boundaries of the non-trawl RCA to allow access to the shelf. As Bellingham is over 100 nautical miles from the edge of the non-trawl RCA, the opportunity for fishing and benefits would need to be enough to cover the operational costs of traveling the long distance compared to coastal ports. With the area relying on Dungeness crab and salmon, there is a need for future, stable sources of groundfish into the area. With

the uncertainty of the potential bycatch catch in the areas, No Action would not be able to provide the buffer needed to allow significant access to these grounds.

Recreational

Depth restrictions and area closures are the primary tools for reducing encounters with yelloweye rockfish on the North Coast, with yelloweye rockfish habitat being prevalent in waters accessed by recreational fisheries (Figure B-16). Key points of Washington management measures analyzed for 2019–20 as they relate to yelloweye ACL alternatives are described below.[22]

Since 2011, yelloweye rockfish HGs have increased, but only slightly, and not enough to allow significant changes to depth restrictions. Yet, while the management measures have remained fairly stable, the 2011 and 2012 Washington recreational fishery exemplifies the uncertainty associated with yelloweye rockfish catch and projections. In 2011, the final yelloweye rockfish catch estimate was 2.36 mt, very close to the pre-season projected impacts of 2.55 mt and below the HG of 2.6 mt. Under the same depth restrictions in 2012 though, there was high yelloweye rockfish catch during the recreational halibut fishery in May and June. At the time, WDFW struggled to balance the timing of a potential closure given the strong community dependence on the recreational fishery in this area and the commitment to keep catch to the Washington HG. August is the end of the short window where the weather and other conditions bring in anglers and fishing dependent business make the bulk of their income and brings in roughly 15 percent of Neah Bay's bottomfish effort. After Labor Day, fishing activity drops substantially with that percentage dropping to 6 percent in September and to zero in October. Ultimately, WDFW closed the year-round recreational bottomfish fishery early on September 4, 2012 (Agenda Item H.5.b WDFW Report September 2012). The final 2012 catch was 3.2 mt, 0.6 mt over the 2.6 mt HG, which equates to 216 yelloweye rockfish.

While effort does drop in September compared to August, this closure still caused significant economic hardship to the communities of Neah Bay and La Push. For example, there were 491 recreational bottomfish trips out of north coast ports in September 2011. In September 2012, due to the early closure of the fishery, recreational bottomfish trips dropped to 255, nearly a fifty percent reduction in angler trips from the year before, and September 2013 saw the lowest effort since 2011 at 175 trips. The 2013 drop in angler trips could have been a direct result of the 2012 early closure, which likely triggered uncertainty in these fishery dependent communities and weakened angler confidence that the season would not be subject to another emergency closure. This illustrates the impacts surrounding uncertainty in projecting yelloweye rockfish impacts that vary from one year to the next under very similar management measures and the negative impacts of yelloweye HGs under the 2011 rebuilding plan.

The early closure of the recreational fishery in 2012 has had lasting impact on north coast stakeholders and the communities of Neah Bay and La Push. Public comment from stakeholders has indicated that management measures that reduce depth restrictions and allow access to lingcod and mid-water species like yellowtail and widow rockfish are important but what is equally important is fishery stability and some certainty that fisheries will remain open through the end of the season so that private anglers can plan for fishing trips and businesses, including charter vessel operators, can make business plans.

Yelloweye rockfish ACL alternatives for 2019–20 are sufficient to consider changes to depth restrictions that range from delaying the start date of the 20 fm depth restriction under No Action, to completely eliminating the 20 fm restriction all together under Alternative 2. These reductions in the length of the

[22] For complete details of the management measures analyzed for 2019-20, see Agenda Item F.2, Attachment 3, April 2018

depth restriction are directly tied to access to more yelloweye rockfish and are projected to increase fishing effort as anglers are able to target deep water lingcod.
Management measures under the No Action Alternative would delay implementation of the 20 fm depth restriction by approximately three weeks. That change allows anglers to access deep water areas where anglers target lingcod early in the spring before summer salmon seasons open. The Washington recreational model is not precise enough to estimate the change in lingcod landings between the alternatives however, based on public comment during stakeholder meetings, it is clear that this access to lingcod is desired by recreational anglers. Under No Action, projected impacts would be 5.22 mt out of the 5.5 mt HG a buffer of only 0.3 mt between projected catch and the HG. However, projecting catch under No Action, or any of the alternatives, is problematic due to the reliance on data that is over ten years old because access to the area seaward of 20 fm has been restricted since 2006. Additionally, this historical data was collected on a yelloweye rockfish population that had recently been declared overfished. In a rebuilding environment where yelloweye rockfish encounters could be higher than expected, there is uncertainty with regard to projected impacts and the ability to keep catch to the specified HG and avoid early closures.

Additional yelloweye rockfish under Alternative 1 would provide the same delayed implementation date for the 20 fm line as No Action in addition to allowing the retention of midwater yellowtail and widow rockfish on salmon trips in July and August. Under Alternative 1, angler trips are projected to increase by 185 compared to No Action. Projected catch is 5.22 mt out of the Alternative 1 Washington HG of 7.9 mt which would provide a 2.68 mt buffer between the projected impacts under the HG and would provide some direct relief from the impacts of an early closure if yelloweye encounters are higher than projected.

Under Alternative 2, there is sufficient yelloweye to consider removing the 20 fm depth restriction completely, this would result in access to deep water areas for an additional five months of the season compared to Baseline. This access is projected to increase angler trips for the north coast subarea by 1,156 trips. Projected impacts would be 10.3 mt out of the 10 mt HG and, in addition to not providing any buffer, may require inseason management measures to keep catch to the 10 mt HG in 2019.

In addition to increasing fishing opportunity for Washington stakeholders, these measures provide income to coastal communities that are highly dependent on fishing, such as Neah Bay and La Push. As described above, non-tribal recreational bottomfish anglers provide a major source of economic activity for these communities, which are located on the Makah and Quileute Indian Reservations respectively. For example, estimated angler trips in the North Coast subarea, which includes the ports of Neah Bay and La Push, would increase from 16,684 under No Action to 16,901 under Alternative 1 or to 17,840 under Alternative 2.

B.5.4.2 South Coast

Commercial

Similar to the North Coast, the South Coast ports (including Westport) are dependent upon Dungeness crab, and more recently, HMS species (primarily albacore) and shrimp (Figure B-18). Groundfish revenues have only made up between ~4 to 15 percent over the 15 year time span and have shifted from non-whiting to whiting. Since 2002, the South Coast groundfish revenue was made up of approximately 60 percent non-whiting and 40 percent whiting; in 2017, whiting made up almost 90 percent of the groundfish revenue. (Figure B-19; Figure B-18) These core species that provide revenue to this region are the most susceptible to boom-and-bust cycles and being affected by ocean conditions and climate change. In 2015, crab landings 1,000-2,000 mt less than the surrounding years and provided almost 40 percent less revenue. If the shrimp harvest had not been at record levels, the overall revenue from shoreside fisheries into the community would have been significantly lower. As described above in the

overarching commercial fisheries section, shrimp forecasts are looking poor and therefore there will need to be another source of fishing opportunity.

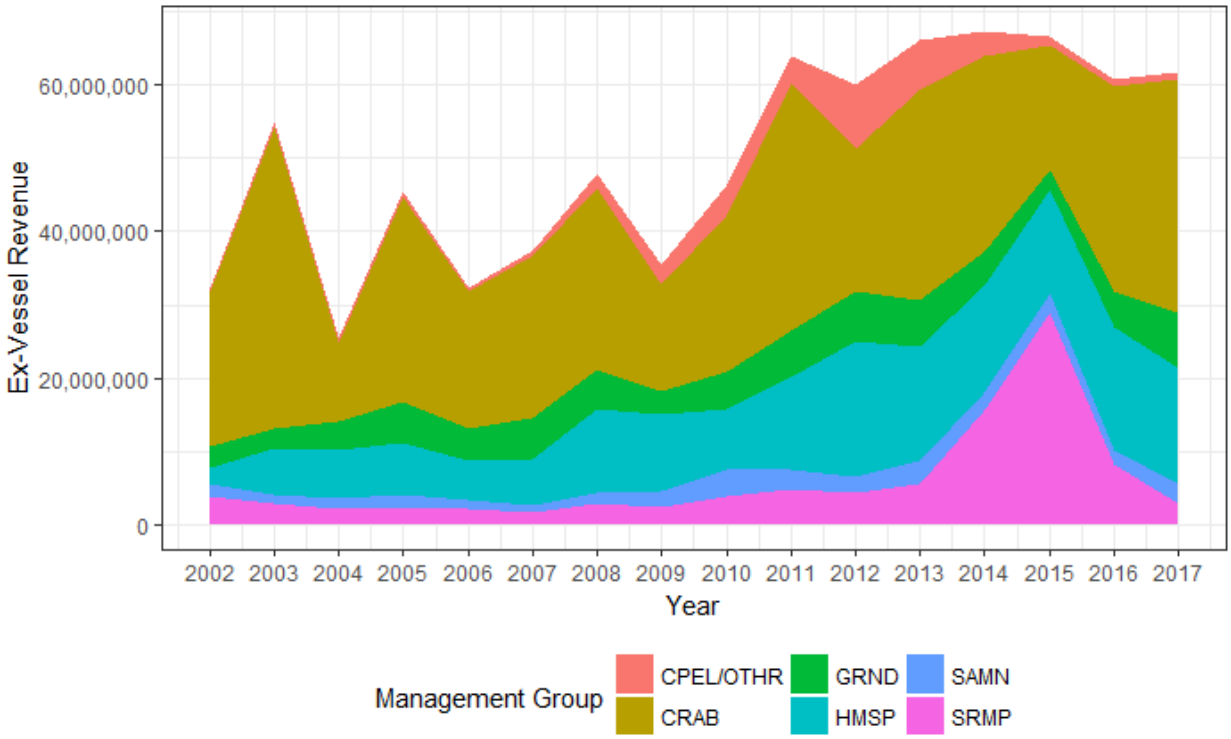

Figure B-18. Ex-Vessel Revenue, 2011–17 for South Coast Commercial Ports

Echoing the collapse in Northern Washington Coast trawl communities, Ilwaco (discussed below with other Columbia River communities) and Westport are the only remaining southern Washington Coast commercial groundfish trawl communities (Five Year Review, pg. 3-204). Yet, with the lack of opportunity for non-whiting fisheries, the South Coast (including Westport) has switched from non-whiting to whiting. Since 2011 alone, the area losing eight non-whiting vessels but gaining four whiting vessels.

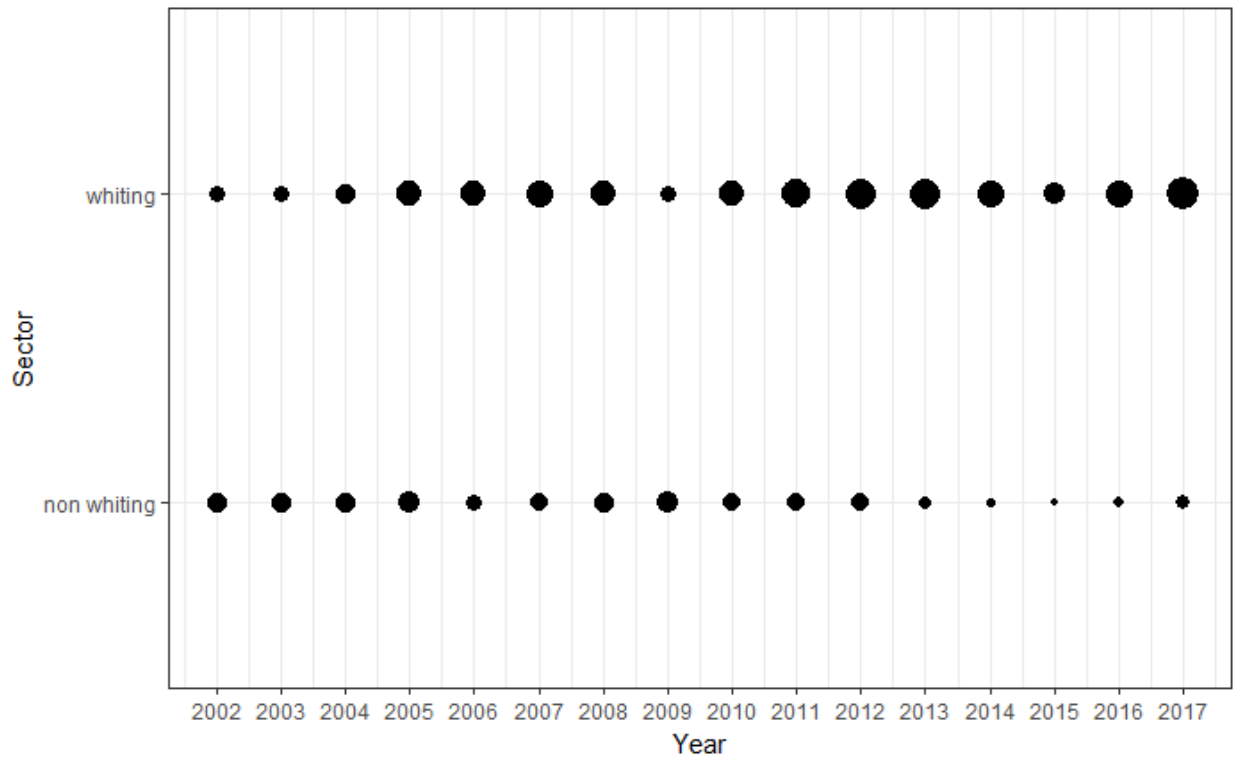

Figure B-19. Relative revenue of whiting and non-whiting into South Coast ports, 2011–17

As was noted during the five-year catch share review hearings in Westport[23]:

> *"Lingcod harvest is constrained by concern over yelloweye bycatch. The constraining species problem is compounded by the vessel caps – a disaster tow...can result in a vessel having to sit out five years" (Westport).*

With No Action, there will likely remain little access to lingcod or shelf rockfish stocks. As described above in the overarching shorebased IFQ section, No Action may not provide enough insurance on an individual level to target lingcod or other in the open areas on shelf. However, Alternatives 1 or 2 may free up quota trading and provide vessels with the enough yelloweye rockfish to fish for underutilized target stocks without the fear of being closed down for a year or multiple years. Additionally, with the non-trawl RCA (and no nearshore fishery available), the fisheries will continue to be constrained to outside of 100 fm, which provides limited or no access to the shelf (Figure B-21). However, under Alternative 1 or 2, as described above, there could be future opportunities outside of the 2019–20 biennium with the additional yelloweye rockfish to consider moving the seaward boundaries to provide additional fishing opportunity.

[23] See http://www.pcouncil.org/wp-content/uploads/2016/10/HrgSum_Westport2016.pdf for write-up.

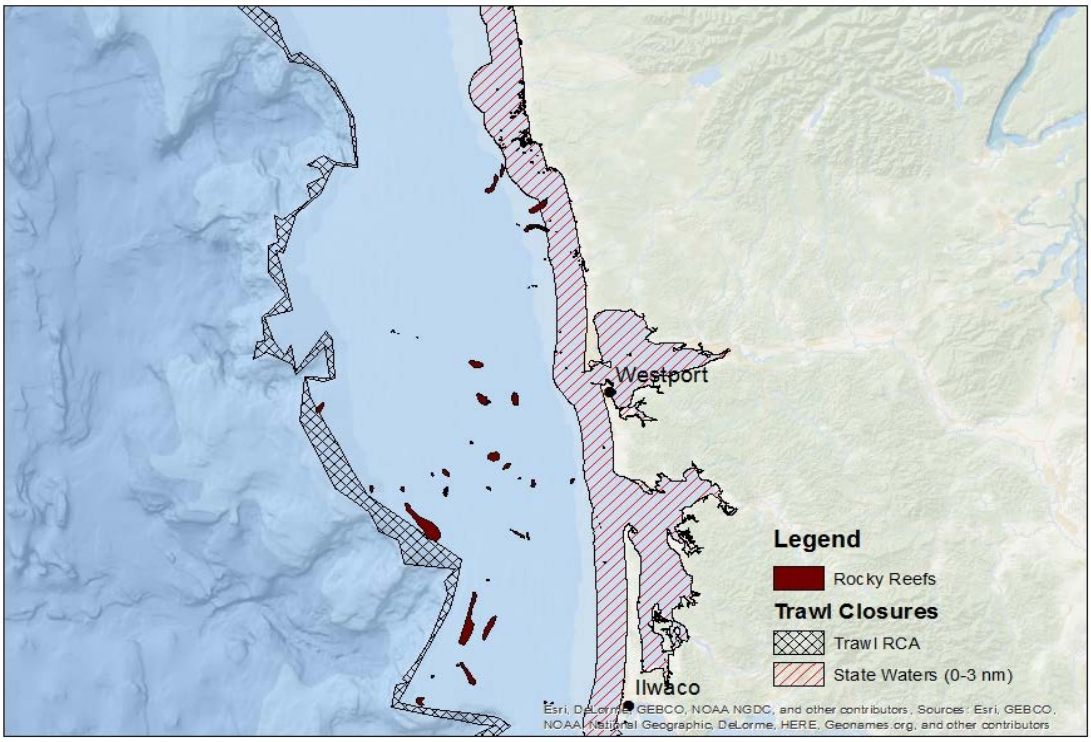

Figure B-20. Trawl RCA for the Washington South Coast.

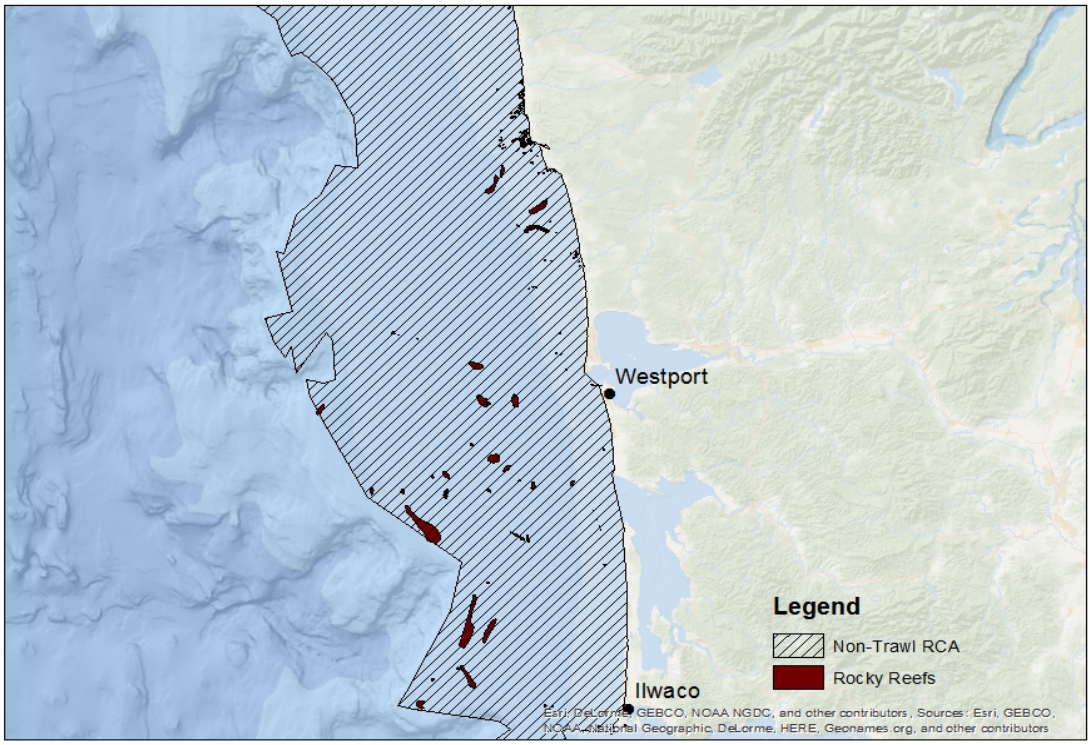

Figure B-21. Non-trawl RCA off the Washington South Coast.

Recreational

The South Coast region includes the port of Westport located in Grays Harbor. Westport is home to Washington's largest charter boat fleet with a growing number of private vessels fishing in this region.

Similar to the North Coast region, depth restrictions are used to reduce encounters with yelloweye rockfish. Encounters with yelloweye rockfish are lower in this region compared to the North Coast region and as such, the depth restrictions are in place for a shorter period of time and are out deeper than in the north coast. Additional fishing opportunity for the South Coast region is focused on measures that allow access to healthy resources such as lingcod. Lingcod are a prized recreational species, especially large lingcod found in deep water areas off the Washington coast and access to lingcod attracts anglers. Unfortunately, access to these areas is limited by available yelloweye rockfish that can also be encountered in these deep water areas.

Under Baseline regulations (2017), with some exceptions during the Pacific halibut season, retention of groundfish (except rockfish) is prohibited seaward of 30 fm from March 15 to June 15 and a deep water lingcod closure at approximately 40 fm is in place all season. Under the No Action Alternative, the implementation of the 30 fm line would be delayed by one month and only lingcod would be prohibited. There would be no change to the deep water lingcod restriction which only allows lingcod retention on days open to the halibut fishery and the two YRCAs would continue to be closed during the entire season. Projected impacts under No Action would be 5.22 mt compared to the 5.5 mt HG.

More yelloweye rockfish under Alternative 1 would implement the 30 fm line on March 15, the same as the baseline but would end two weeks earlier at the end of May rather than June 15. In addition, Alternative 1 would allow fishing in the deep water lingcod closed area for two weeks in June and two weeks in September. Additional yelloweye rockfish under Alternative 1 provides more opportunity to anglers along with some protection via a buffer of 2.68 mt between the projected impacts and the HG to avoid disruptive inseason measures or an early closure of the fishery if yelloweye rockfish encounters are higher than expected. Also similar to the North Coast, there is uncertainty with projected yelloweye rockfish impacts as fishing opportunity expands into these deep water areas that have been closed for many years. Based on public comment at stakeholder meetings, anglers from the South Coast area prefer an approach that combines a small change in the time that the 30 fm depth restriction is in place with a conservative approach to accessing the deep water area. Access to the deep water area is separated into two, two week blocks, one in June and one in September. This approach allows for early season catch to be assessed in time make inseason adjustments to the September deep water opener if yelloweye rockfish catch is higher than expected.

Changes under No Action and Alternative 1 are not expected to result in increased angler trips. While these alternatives do provide some additional opportunity for anglers to fish in deep water areas, the expectation is that anglers would simply expand the areas where they fish as the changes are not so different from baseline measures to attract new anglers. Under Alternative 2, the 30 fm line could be removed for the entire season and would result in an additional 2,698 angler trips.

B.5.4.3 Tribal

The four coastal treaty tribes, the Makah Tribe, Quileute Tribe, Quinault Indian Nation, and the Hoh Tribe are co-managers of fisheries resources with the state of Washington. Federal courts have ruled that the treaty tribes reserve 50 percent of the harvestable resources passing through their respective treaty areas, generally referred to as their "usual and accustomed areas," or U&A's (U.S. v. Washington, 384 F. Supp. 312 (W.D. Wash. 1974), U.S. v Washington, 873 F. Supp. 1422 (W.D. Wash. 1994)) (Washington

Marine Spatial Plan). The North Coast region includes fisheries managed by the Makah, Quileute, and Hoh Tribes while the South Coast includes the Quinault Indian Nation.

Similar to the non-treaty fisheries, the coastal treaty tribes have seen a decline in other fisheries. The preliminary 2017 ex-vessel value reported to PacFIN (as of January 19, 2018) for all salmon species taken in Puget Sound and Washington coastal commercial treaty Indian fisheries (excluding the Columbia River) was $1.8 million. These are the lowest values recorded for these fisheries going back to 1981, with a notable decline from historic averages in the most recent years (2015–17). From 1981 through 2016, the inflation-adjusted average annual ex-vessel value of commercial treaty Indian fisheries in Puget Sound and Washington coastal inside areas was $21.1 million (2017 Salmon SAFE report).

Every biennium, the tribes request a set aside for yelloweye rockfish (among other species) to prosecute their fisheries. Similar to non-treaty fisheries, treaty commercial fisheries are managed to minimize yelloweye rockfish bycatch. Specifically, the tribes have managed to a 100 lb. trip limit for yelloweye rockfish during all groundfish trips since 2009 (Agenda Item F.9.a., REVISED Supplemental Tribal Report 1, November 2018). The tribes have not been utilizing the full set aside of 2.3 mt as shown in Table B-16.

Table B-16. 2009–16 yelloweye rockfish mortality (Source: TM report).

Year	Landings (discards not included) (mt)
2009	0.27
2010	0.44
2011	0.06
2012	0.15
2013	0.36
2014	0.38
2015	0.64
2016	0.19

In the past, the tribes had an active dinglebar fishery targeting lingcod that was closed due to the impacts that it would have on yelloweye rockfish. Recently, the tribes have reopened directed fisheries for lingcod and are analyzing current ratios of yelloweye rockfish to lingcod to track impacts to yelloweye rockfish as not to exceed current yelloweye rockfish set asides. As shown in Figure B-22, fixed gear landings of lingcod decreased by 73 percent from 2009 to 2010, relative to the 23 percent drop in the ACL from 17 mt in 2009 to 14 mt in 2010 under Secretarial Amendment 1, also refered to as PCGFMP Amendment 16-5.

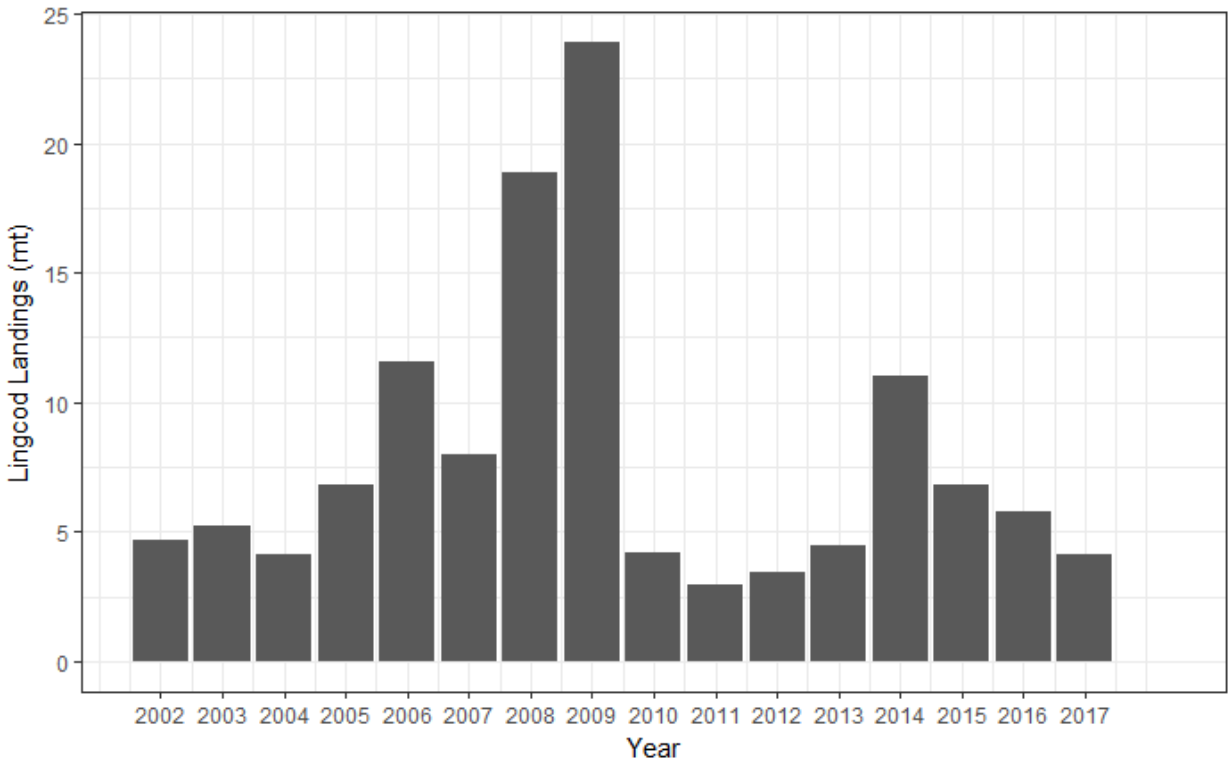

Figure B-22. Tribal Lingcod Landings, 2002–17.

Under No Action, opportunities to continue to increase harvest of lingcod is limited. The benefit of Alternative 1 and 2 over No Action is that it provides a buffer against the tribal yelloweye rockfish set aside as the tribes explore new fisheries. As with all Washington fisheries, the presence of yelloweye rockfish dictates management as shown in Figure B-23within the Makah and Quileute U&A's, there is a large portion with rocky reef habitat. Similar to the non-tribal commercial fisheries, the additional yelloweye rockfish under Alternative 1 and 2 would provide opportunities for tribal managers to assess how much yelloweye rockfish would be needed to harvest a larger portion of the lingcod set aside in the future. Additional information from allowing these small but economically important new opportunities will provide tribal managers with data to better estimate how much yelloweye rockfish is needed to harvest a larger portion of the treaty lingcod HG in the future.

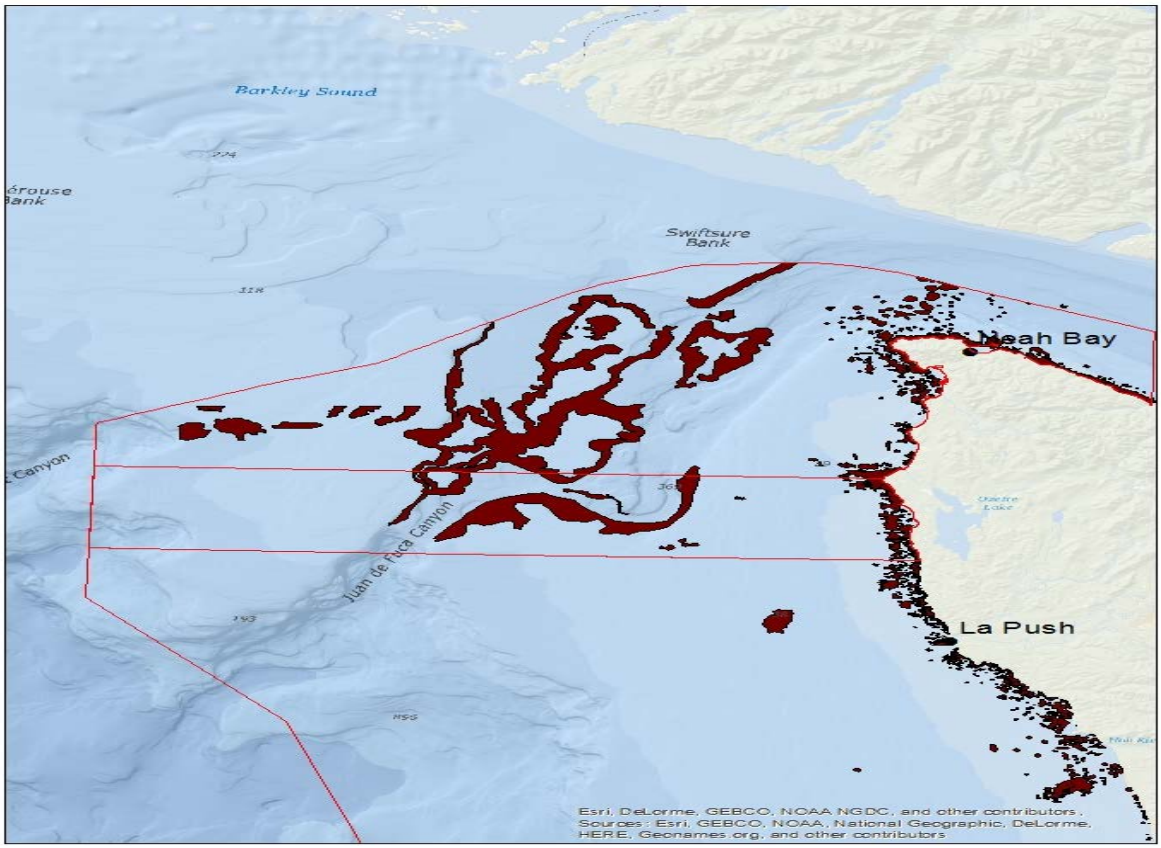

Figure B-23. Current Tribal U&A boundaries for Makah and Quileute[24] Tribes.

The Quileute Tribe and the Makah Tribe both have ports that accommodate both non-treaty recreational and non-treaty commercial fishermen. A major portion of the tribal economies is from revenues of non-treaty recreational and commercial fishermen landing fish or utilizing infrastructure within the respective communities. While there was some decline in the non-tribal groundfish vessel activity to these areas when yelloweye rockfish was declared overfished in 2002, the closure of Cape Alava in 2007 and the groundfish buyback resulted in active groundfish vessels dropping from 53 in 2006 to only 16 in 2017 and groundfish landings reducing almost six-fold. With Cape Alava now re-opened, there could be additional activity into these ports, providing revenue to the treaty communities. It will ultimately depend on the ability for vessel owners to acquire yelloweye rockfish quota to fish in these areas that are considered "hotspots," which will be limited under No Action compared to Alternatives 1 and 2. Non-trawl landings will continue to be limited with the non-trawl RCA in place. Additionally, as will be described below, Alternative 1 or 2 would lead to increased recreational participation out of the Neah Bay and La Push tribal communities, which would provide indirect benefits to the treaty tribes. The Quinault Indian Nation and the Hoh Tribe are less dependent on non-tribal recreational fisheries and while they

[24] On March 5, 2018, the United States District Court for the Western District of Washington revised the western boundaries of the U&A fishing areas for the Quileute Indian Tribe and the Quinault Indian Nation. *United States v. Washington*, 2:09-sp-00001-RSM, (W.D. Wash. March 5, 2018) (Order Regarding Boundaries of Quinault and Quileute U&As). These revised boundaries mirror the coast of the Washington shoreline at a distance of 40 miles for the Quileute Indian Tribe and 30 miles for the Quinault Indian Nation. Other boundaries and their supporting rationale described in previous rulemakings on the U&A fishing areas are not affected by this rulemaking. This map has not been updated with this change.

may be less affected by increased opportunities in non-tribal sectors additional yelloweye rockfish available under Alternative 1 and 2 may allow expansion of tribal fisheries targeting lingcod.

B.5.4.4. Columbia River

Commercial

The Columbia River ports of Astoria, Warrenton, Hammond, Ilwaco, and Chinook are home to diversified commercial fisheries (Figure B-24), and contain one of the largest trawl fisheries on the West Coast that features a strong mid-water component for both whiting and rockfish. Overall, commercial fishery ex-vessel revenues held at a relatively steady $50-55 million per year from 2002–10, and then rapidly increased to $70-80 million per year from 2011–15 due to near record growth in all fisheries coinciding at once. The majority of this growth was attributed to record highs occurring in the crab and Pacific whiting fisheries.

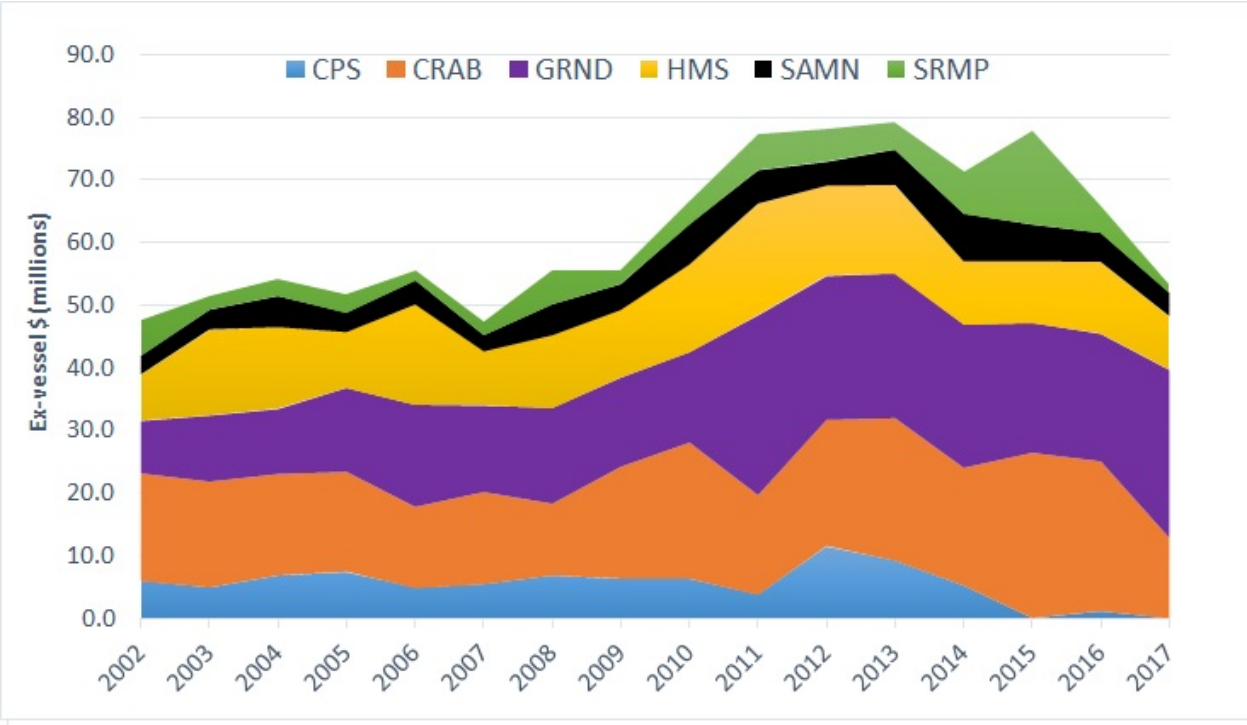

Figure B-24. Ex-vessel revenue trends (in millions of inflation adjusted $USD) by year, fishery, and in total for the Columbia River ports.

However, there has been a nearly $30 million decline in ex-vessel revenues for 2017 in comparison to the 2011–15 highs. This has been primarily due to sharp declines occurring in the CPS, crab, salmon, and shrimp fisheries all at once. The decline was most pronounced for the CPS fishery due to a crash of the sardine population that reduced yearly revenues from $6-12 million prior to 2015 to $0 in 2017. While there was a slight surge in the 2016 anchovy fishery to $1.2 million that helped offset sardine loses, but that was a one-time occurrence. The 2017 shrimp fishery was down from the $4-$15 million yearly levels of 2010–16 to $0.4 million and the salmon fishery of $3.8 million was down ~$1.8 million from $5.6 million average from 2010–16 levels. The largest overall loss came from the crab fishery, which was typically worth above $20 million per year from 2012–16 but has declined to $13 million in 2017.

The future of the Columbia River's commercial salmon, CPS, and pink shrimp fisheries is expected to remain at poor as described in the overarching commercial sections above. If the crab fishery remains at lower levels, then the overall future loss could remain at ~$30 million down from 2011–15 levels. However, if the crab fishery returns to more typical levels of ~$20-25 million that would add $10 million, then the future losses would be reduced to ~20 million per year. In summary, the future expected losses for the Columbia River are expected to remain $20-$30 million below 2011–15 levels depending on the strength of the crab fishery until the CPS, salmon, and shrimp fisheries recover.

With the potential $20-30 million in expected future ex-vessel losses for the Columbia River, the only available opportunity for these communities would be through attainments of underutilized groundfish stocks constrained by yelloweye rockfish, which are estimated to be worth ~$24 million in ex-vessel revenue. As discussed in the overarching trawl and fixed gear sections, the higher Alternatives 1 and 2 would provide greater economic benefits than No Action. Alternatives 1 and 2 would be expected to result in higher attainments of lingcod and other trawl stocks due to increased market flow of yelloweye rockfish QPs and reduced consequences and mitigate some concerns of catching yelloweye rockfish. As demonstrated in the fixed gear section, during the next eight years when the stock rebuilds under No Action (2019–2026), the projected ex-vessel revenue gain for No Action is +5 million, +15 million Alternative 1, and +28 million for Alternative 2.

However, there may not be much, if any, additional benefits for the Columbia River fixed gear fisheries under No Action since nearly all the rocky reef habitat/fishing groundfish occurs within the closed non-trawl RCA (Figure B-25) and marine reserves. The Columbia River fixed gear fleet will continued to be constrained unless the non-trawl RCA boundaries are changed to provide opportunity to increase attainments of lingcod and mid-water rockfishes. RCA re-openings of this scope would not be possible under No Action, which barely covers year-to-year volatility ("boom-busts") of yelloweye rockfish bycatches with baseline regulations. Alternatives 1, and especially 2, would be needed to consider any changes to the non-trawl RCA in a future process.

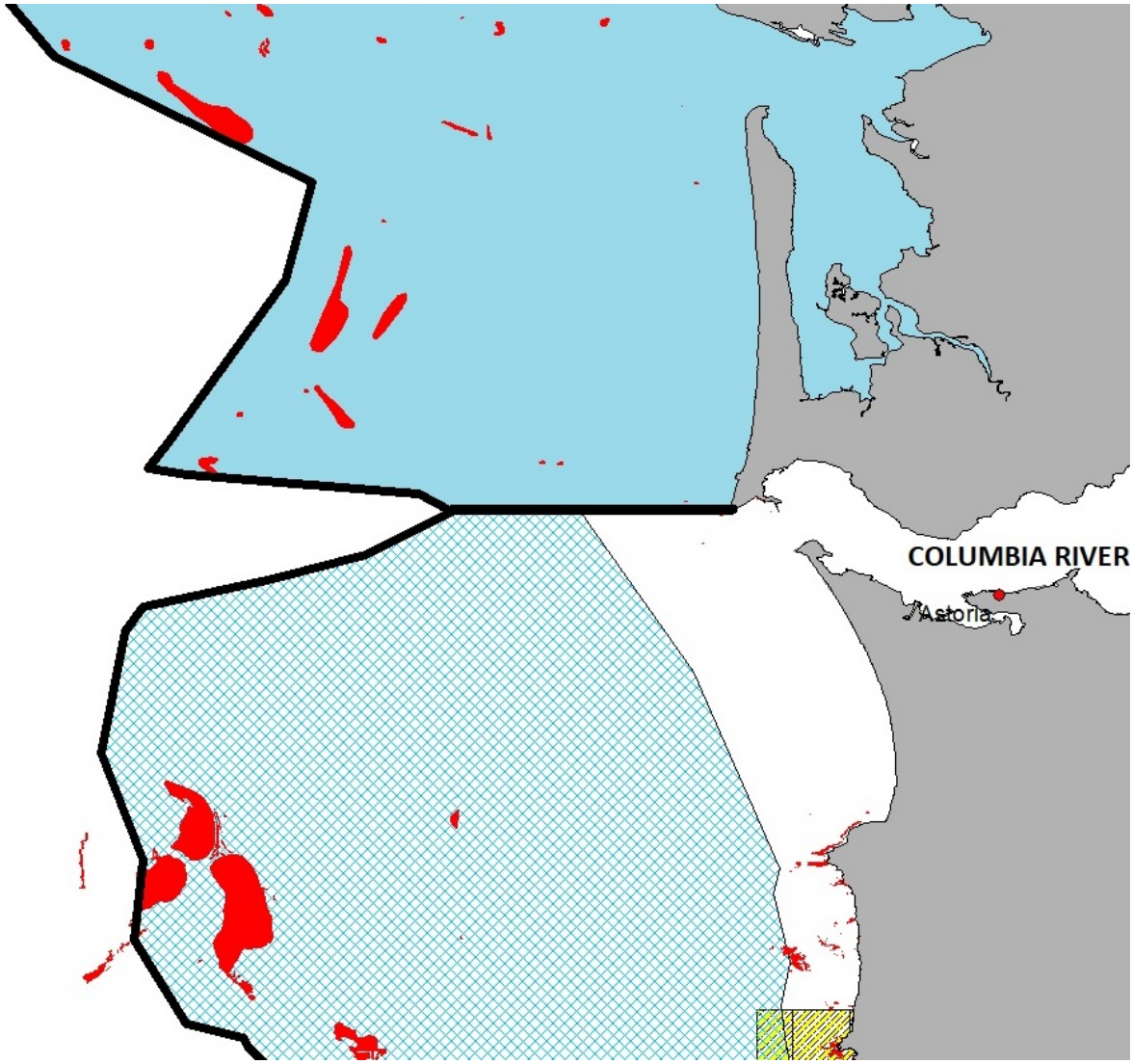

Figure B-25. Map of the rocky reef fishing grounds (red) where the Columbia River fixed gear fishery would need to fish in order to increase their attainments of lingcod and mid-water rockfishes, but are closed due to occurring within the non-trawl RCA. The WA closure = solid blue; the Oregon closure = checkered blue (yellow = marine reserve closure).

Recreational

Management of recreational fisheries in the Columbia River subarea covers waters off of both Washington and Oregon. In the Washington portion of this subarea, yelloweye rockfish impacts are relatively low compared to other more northern areas on the Washington coast and as such, management measures focus on bottomfish restrictions that prohibit anglers from keeping most groundfish species when Pacific halibut are on board. There are no depth restriction in the Washington portion of the Columbia River area. Under baseline measures, anglers fishing in Washington can retain lingcod with halibut on board. Under Alternative 1, WDFW analyzed allowing rockfish retention when halibut are onboard but will evaluate this change when considering changes to the Pacific Council's Pacific Halibut Catch Sharing Plan. Allowing the retention of rockfish with halibut on board is not expected to increase angler tips as those trips are primarily driven by halibut availability in this area and influenced by halibut

opportunity in other areas (e.g., halibut anglers may shift effort to the Columbia River area when other areas are closed).

Off of Oregon, yelloweye rockfish habitat is more prevalent near other ports farther south. However, unlike Washington and California, the Oregon recreational groundfish fishery is managed as one area, such that regulations are the same regardless of area and port. Therefore, even though there isn't much yelloweye rockfish habitat in waters off of Oregon in the Columbia River subarea, the regulations, including seasonal depth restrictions are the same as for the rest of Oregon, and are intended to limit yelloweye rockfish impacts. Similar to other areas, stakeholders in this area are interested in accessing healthy lingcod stocks particularly when targeting Pacific halibut, but anglers out of other Oregon ports are currently more restricted in terms of groundfish retention during all-depth Pacific halibut days when halibut are onboard (e.g., no lingcod retention).

Allowing increased access to lingcod in Oregon has been challenging due to the potential yelloweye rockfish bycatch and the differences in yelloweye rockfish HGs and approaches to managing fisheries to stay within those HGs.

The No Action Alternative does not provide enough yelloweye rockfish to consider regulatory changes that would allow access to more lingcod in Oregon. Anglers requested ODFW look into being able to "go back out to 40 fm" as the first measure to change if any yelloweye rockfish above the current HG (3.0 mt) were to become available. No Action does not provide enough yelloweye rockfish over the current HG to accommodate both the change to the depth restriction and lingcod on all-depth halibut trips. Additional yelloweye rockfish under Alternative 1 and 2 could allow for more access to deep water opportunities such as allowing rockfish retention with halibut on board in Washington and potentially allowing retention of lingcod when anglers are targeting all-depth halibut in both Washington and Oregon, compared to No Action. Angler trips under these scenarios was not analyzed, as mentioned above, the opportunity Pacific halibut opportunities are the driver of effort.

B.5.5 Oregon Communities

Oregon has recreational fisheries that primarily target groundfish, salmon, Pacific halibut, and tuna. The main commercial fisheries are crab, groundfish, pink shrimp, tuna, salmon, and CPS (e.g., sardine and anchovy). Astoria and Newport are two of the largest commercial ports on the West Coast, and are also the top ranking coastwide trawl ports. Oregon also has some the largest fixed gear ports for sablefish such as Newport and Coos Bay, but also caters to a relatively small-scale nearshore fixed gear fishery that mainly occurs in state waters.

Most Oregon ports have less than 15,000 residents, and a moderate or high dependence on recreational and commercial fisheries and moderate to high social vulnerability (Table B-17). Fisheries contribute ~$615 million per year in income and ~10,500 jobs to Oregon coastal communities each year. These are based on $544 million and 10,000 jobs for commercial fisheries, and ~$70 million and 500 jobs for recreational fisheries (The Research Group 2017[25] and The Research Group 2015[26], respectively). In Lincoln County, which is home to one of the largest West Coast ports of Newport, commercial fisheries provide 20 percent of local net earnings (The Research Group 2017[25]). In the isolated small fishing community of Port Orford (population = 1,153), "9% of men and women in the community were

[25] https://www.dfw.state.or.us/agency/docs/TRG%20OR%20Comm%20Fishing%20Econ%20contribution%20thr%202016%20narrative%20ver.%201.5.pdf
[26] https://www.dfw.state.or.us/agency/docs/ODFW_Marine_Rec_Ec_Effects_2013-2014.pdf

employed in agriculture, fishing, and hunting, but this number may not include self-employed fishermen (NMFS Community Profile[27]).”

Table B-17. Vulnerability and dependence in Oregon fishing communities and groupings.

Community	Grouping	Social Vulnerability	Recreational Dependence	Commercial Dependence
Astoria	Astoria	Moderate	High	High
Tillamook	Tillamook	High	High	High
Garibaldi	Tillamook	High	High	Moderate
Pacific City	Tillamook	Moderate	High	High
Depoe Bay	Newport	Moderate	High	High
Newport	Newport	Moderate	High	High
Florence	Newport	Moderate	Moderate	Low
Winchester Bay	Coos Bay	Moderate	High	High
Coos Bay	Coos Bay	High	High	High
Bandon	Coos Bay	Moderate	High	High
Port Orford	Brookings	High	Moderate	High
Gold Beach	Brookings	Moderate	High	Low
Brookings	Brookings	Moderate	High	High

(Source, Karma Norman/NWFSC Human Dimensions Program)

A common theme for Oregon is that the broad depth restrictions used to minimize bycatch of yelloweye rockfish for the commercial fixed gear and recreational fisheries have resulted in numerous adverse effects such as:

(1) Under attainment of healthy shelf groundfish stocks such as lingcod and mid-water rockfishes;
(2) Heavily consolidating fishing activity into nearshore open depths (shore to 30 fm), which has concentrated pressure on nearshore stocks and resulted in conservation issues (i.e., ACL overages for black rockfish and cabezon in 2017);
(3) Caused disproportionately high impacts to port communities that lost most or all of their groundfish reefs to the closures (e.g., Winchester Bay); and
(4) Introduced safety (NS-10) concerns to those who seek to fish the open grounds seaward of the RCA that are far offshore (discussed next).

As shown (Figure B-26), the scope of the non-trawl RCA (30-100 fm) that is equivalent to the recreational depth restrictions (closed > 30 fm April-Sept) is expansive off Oregon. For instance, the non-trawl RCA closes off 93 percent of the closest waters to shore around Florence (41 of 44 miles offshore). In general throughout the coast, people can fish from 0-3 miles shoreward of the RCA, but have to travel another 20-44 miles offshore to reach the next open waters seaward of the RCA. Traveling more than 10–

[27] https://www.nwfsc.noaa.gov/research/divisions/cb/ecosystem/humandim/communityprofiles/Oregon/PortOrford_OR.pdf

15 miles offshore becomes increasingly dangerous for small recreational boats as well as for the "sport-like" commercial fixed gear boats who participate in the nearshore fishery:

> "*Rough seas can unexpectedly develop, and if they get caught offshore, it can take hours to return to port as they cannot go much faster than 5 miles per hour in rough seas otherwise waves begin crashing over the sides of the boa*t (Jeff Miles, Groundfish Advisory Sub-panel OA representative, personal communication).

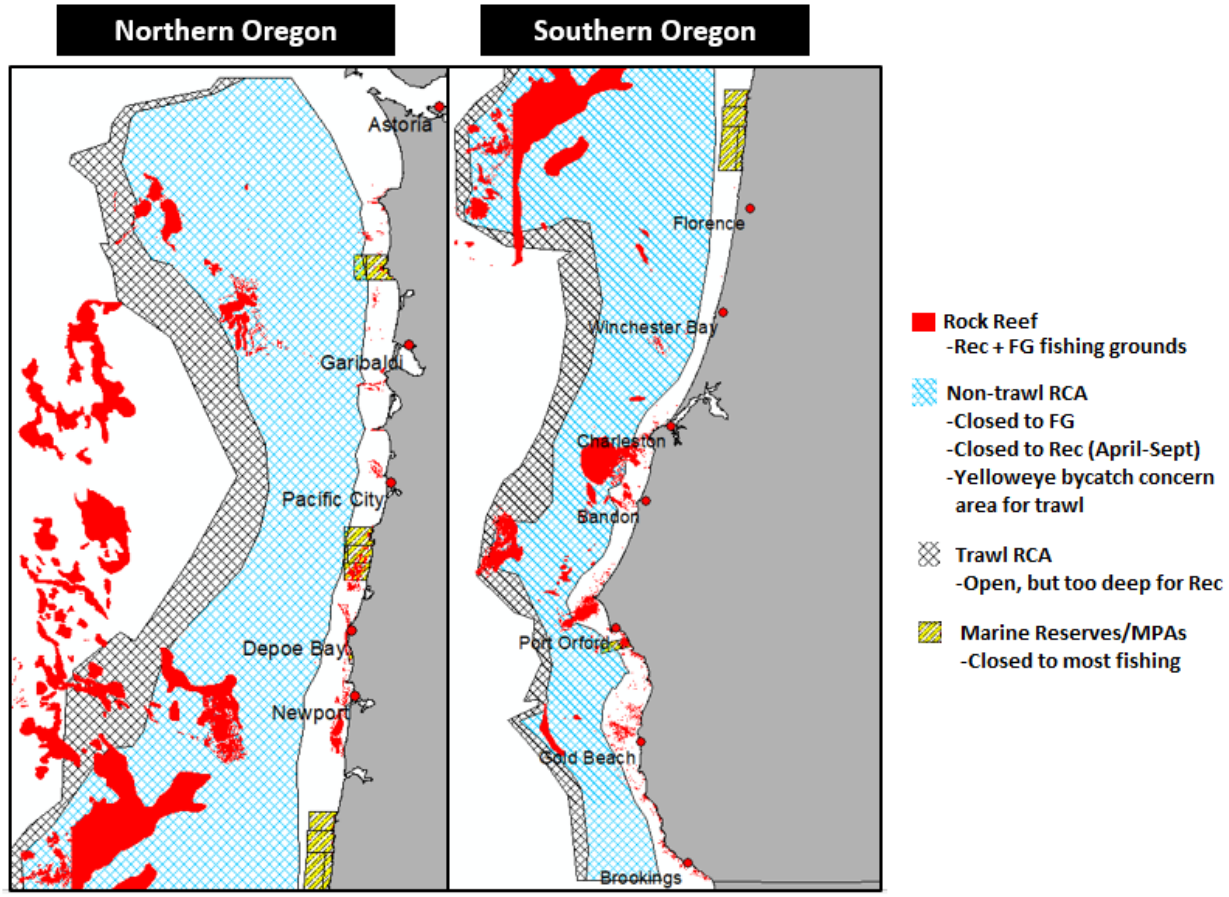

Figure B-26. Commercial fixed gear and recreational groundfish fishing grounds that are closed due to yelloweye rockfish bycatch constraints. The non-trawl RCA that is closed from 30-100 fm is equivalent to the > 30 fm state recreational depth closure from April-Sept.

In Oregon, higher yelloweye rockfish ACLs of Alternatives 1 and 2 that could be used to reduce the scope of the non-trawl RCA and recreational fisheries seasonal depth restrictions extend to many of the NS-1 objectives such increasing conservation (e.g., less pressure on heavily exploited nearshore stocks), optimal yields of underutilized stocks (e.g., lingcod), efficiency, safety, and promoting greater equality amongst communities.

In the recreational fishery, ports that only have reefs in the deep depths, which are closed to fishing to limit yelloweye rockfish impacts, have experienced some of the most negative consequences from conservative management, and stand to gain the most from the increased yelloweye rockfish ACLs available under Alternatives 1 or 2. Alternatives 1 would allow the seasonal depth restriction in state

regulations to be changed from 30 fm to match what is in federal regulations (40 fm), and the depth restriction would be reduced by two months (April and September). Alternative 2 would allow for removal of the seasonal depth restrictions, providing for year-round opportunities at all depths. This would anglers to access reef structure that occurs deeper than the seasonal depth restrictions. Out of some ports (i.e., Winchester Bay) all of the reef structure occurs deeper than the seasonal groundfish depth restriction (as a reminder, the entire Oregon coast is managed as one unit, regulations are the same out of all ports). Currently, these ports are vulnerable since they are nearly entirely reliant on the salmon and tuna fisheries, which can vary considerably from year to year (Agenda Item H.1.a Supplemental ODFW Report September 2015). Moving the depth restriction to 40 fm from the current 30 fm (state regulation), as would be possible under No Action, does not help those ports where all reef structure occurs deeper than 40 fm, and provides modest benefits to ports that have some reef structure between 30 and 40 fm. Additionally maintaining the current federal depth restriction would not facilitate shifting effort off of the more nearshore species for which attainment of those HGs could close the fishery prematurely. The changes in months with seasonal depth restriction under Alternative 1 will likely increase angler effort, as there will be more opportunities to target deep water lingcod, and lower chance of fishery closure due to attainment of more nearshore species HGs. Removing the seasonal depth restrictions, as would be possible under Alternative 2 is also likely to increase angler effort for the same reasons as Alternative 2. However the Oregon projection model currently not set up to project angler trips because of the many other factors besides groundfish regulations that influence angler effort (gas prices, weather, and opportunities in other fisheries). Additionally times and areas will be open that have not been in fifteen years, which makes it difficult to anticipate how much effort the new opportunity may entice.

ODFW has reported that each of its recreational fisheries is currently operating "at capacity," or in some cases beyond, meaning due to restrictions on each target stock and bycatch limitations, no target fishery has the capability to absorb overflow from other fisheries (Agenda Item H.1.a Supplemental ODFW Report September 2015).

Recreational effort overall is generally increasing in Oregon, and spiked in 2014 with a surge in salmon trips. Oregon recreational trips targeting salmon (including "combination"[28] trips) subsequently dropped over 50 percent from the high in 2014 of 121,000 trips to about 40,000 trips in 2016 and 2017. The average number of trips from 2015–17 was about half of the 2011–14 period (approximately 40,000 vs. 80,000; Figure B-27). This decline exceeded projections in a recent Environmental Assessment for a new type of recreational gear in Oregon recreational bottomfish, which used an estimated reduction in trips associated with the collapse of the Chinook salmon fishery to 14,000 fewer trips per year. The actual number of trips declined by about 30,000 from 2011–14 to 2015–17, with an average of about 40,000 trips in 2016–17. During that same time period groundfish trips have been steadily increasing from 75,000-80,000 per year prior to 2015 to exceeding 100,000 in 2015 and 2017,[29] and over 95,000 in 2016 (Figure B-27).

[28] "Combination" trips are any trip that targets salmon plus something else.

[29] This was even with the recreational groundfish fishery closing in mid-September, the re-opening early October to flatfish and midwater rockfish only.

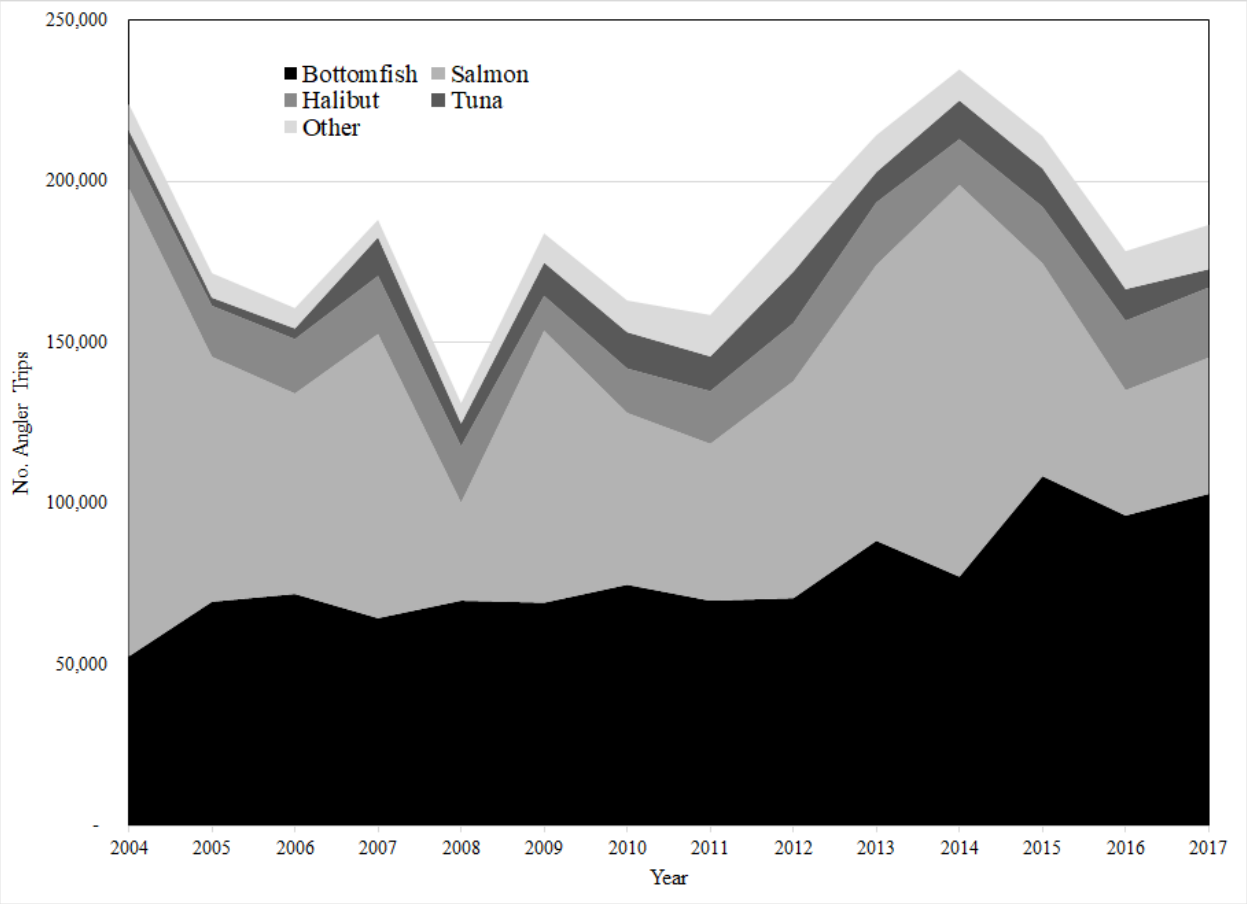

Figure B-27. Number of annual angler trips, by trip type in Oregon 2004–17.

An expansion in groundfish recreational trips may offer some resilience to the recreational fishing community in the face of losses in recreational salmon fishing. The decline in salmon recreational trips in 2015 was accompanied by a surge in bottomfish trips, a level maintained in 2016–17 (Figure B-27). Trips were on track to outpace 2015–16 levels in 2017, when ODFW had to close the recreational bottomfish fishery in September due to concerns with exceeding the states HGs for yelloweye rockfish, as well as cabezon and black rockfish. While development of new gear types may increase access to underutilized midwater rockfish stocks with minimal yelloweye rockfish impacts, the Oregon recreational fishery does not currently have sufficient yelloweye rockfish to support the surge in recreational bottomfish trips displaced from the salmon fishery. The No Action Alternative would allow for the seasonal depth restriction in state regulations (30 fm) to be liberalized to what is in federal regulations (40 fm) and allow two additional months of all-depth fishing (April and September). That would reduce some of the pressure on nearshore species such as black rockfish and cabezon, however likely not enough to fully offset the recent surge in effort. There would still be potential for inseason restrictions or closure of the fishery due to attainment of one of the nearshore species' HG. Alternatives 1 and 2 would allow for removal of the seasonal depth restriction; though the state may retain the depth restriction in June, July, and August, to be precautionary. If progress towards allocations is different than expected the depth restrictions could be adjusted or removed inseason or for the second year of the biennium. This would take further pressure off of the more nearshore species, allow additional targeting of underutilized offshore species, allow additional opportunity for deep water lingcod, and reduce the potential for early closure due to attainment of a nearshore species HG.

Recreational Pacific halibut fisheries incidentally catch yelloweye rockfish, and increasing impacts in the Pacific halibut fisheries all-depth seasons has lead ODFW to implement management measures to restrict yelloweye rockfish impacts in the recreational Pacific halibut fisheries (Agenda Item I.1.a ODFW Report September 2016), so that the groundfish fishery is not impacted severely. The Pacific halibut fishery is open to all depths on a limited number of days to reduce potential interactions with yelloweye rockfish. Even so, those few days (15-30 days) in some years, recreational Pacific halibut fisheries account for a large percentage of the total allowable Oregon recreational impacts (> 25 percent; Agenda Item E.1.a., ODFW Report, November 2017). Prior to 2017, the Catch Sharing Plan allowed inseason modification of Pacific halibut regulations only due to attainment of Pacific halibut allocations, with no provisions for modification due to bycatch impacts on other species. As a result, the only option available to limit recreational yelloweye rockfish impacts off Oregon was by restricting the groundfish fishery; Pacific halibut fisheries were held harmless despite their contribution to yelloweye rockfish impacts.

The summer all-depth Pacific halibut fishery is one of the most popular in Oregon, with upwards of 1,000 private vessels participating on any given open day. If the summer all-depth fishery was closed, or further restricted, due to yelloweye rockfish impacts, this would cause a reduction in the number of Pacific halibut angler trips, some of which would likely migrate into the bottomfish fishery.

Albacore tuna is another popular target for Oregon recreational anglers especially in the late summer and early fall (July–September), however their availability to most anglers varies greatly year to year. Some years the tuna are 15-20 miles offshore, which is within reach of many private fishing vessels. However, in some years such as 2017, the tuna remain 60-75 miles, or farther, offshore, which is too far for most private vessels to venture. In those years, a portion of the trips that would have targeted tuna, instead target groundfish or Pacific halibut, increasing effort and yelloweye rockfish bycatch in those fisheries.

In Oregon, No Action would allow the state-specified 30 fm seasonal depth restriction to be moved to be the same as the federal (40 fm) and for fewer months with depth restrictions, and Alternatives 1 and 2 would allow for year-round all depth fishing, additional lingcod opportunities, and/or reduce restrictions on groundfish retention during all-depth Pacific halibut trips. This could restore groundfish fishing opportunity for Winchester Bay, and other Oregon ports that have been negatively impacted due to seasonal depth restrictions that were put in place to minimize impacts to yelloweye rockfish. One of the greatest benefits come from providing a hedge against closure of the nearshore recreational groundfish fisheries, as occurred in 2017. Since the rebuilding plan was last revised, there has been a near doubling of recreational bottomfish angler trips due in large part to spillover from poor and closed salmon seasons (Figure OR REC TRIPS) and the overall economy rebounding. This recent pulse of growth has caused great strain to quotas of nearshore species such as black rockfish and cabezon, and resulted in overages in 2017 that led to complete closure of the fishery in September. Higher yelloweye rockfish allocations could allow more months with deeper fishing, and alleviate pressure on the more nearshore stocks, which may lessen the chances of having to take additional restrictions, or cause a complete closure.

B.5.5.1 Astoria

Commercial and recreational summaries for Astoria are provided under the Columbia River community section above. Astoria is one of the largest commercial fishing communities on the West Coast and the main community hub of the Columbia River.

The main take-homes for the commercial fisheries are: (1) total ex-vessel revenues have dropped by ~$30 million due to declines in non-groundfish fisheries; (2) future ex-vessel revenues are expected to remain down $20-$30 million, based on high or low crab seasons as bookends, since the CPS, salmon, and shrimp fisheries are expected to remain poor; (3) higher Alternatives 1 and 2 could provide additional

groundfish revenues for trawl and fixed stocks that could help offset those loses; and (4) No Action may not provide much if any benefit for the fixed gear fisheries, since higher yelloweye rockfish allocations would be needed to reduce the scope of the non-trawl RCA to open up their limited shelf fishing grounds that currently closed.

The main take-homes for the recreational fisheries are: There is minimal recreational groundfish effort out of the ports along the Columbia River in Oregon. However, there is some effort for Pacific halibut which could be enhanced by opportunities to retain groundfish (specifically lingcod) when participating in the all-depth fishery. Changing depth restrictions and/or allowing retention of other species on all-depth Pacific halibut trips will have minimal impact on effort (in terms of angler trips) as Pacific halibut opportunities are the effort driver. However, angler enjoyment and satisfaction would increase by the additional opportunities.

B.5.5.2 Tillamook (including Pacific City)

Commercial

In terms of total overall ex-vessel revenues (inflation adjusted), Tillamook peaked at ~$6 million per year from 2003–05 and has since declined to a relatively constant $3–$4 million per year since (Figure B-28).

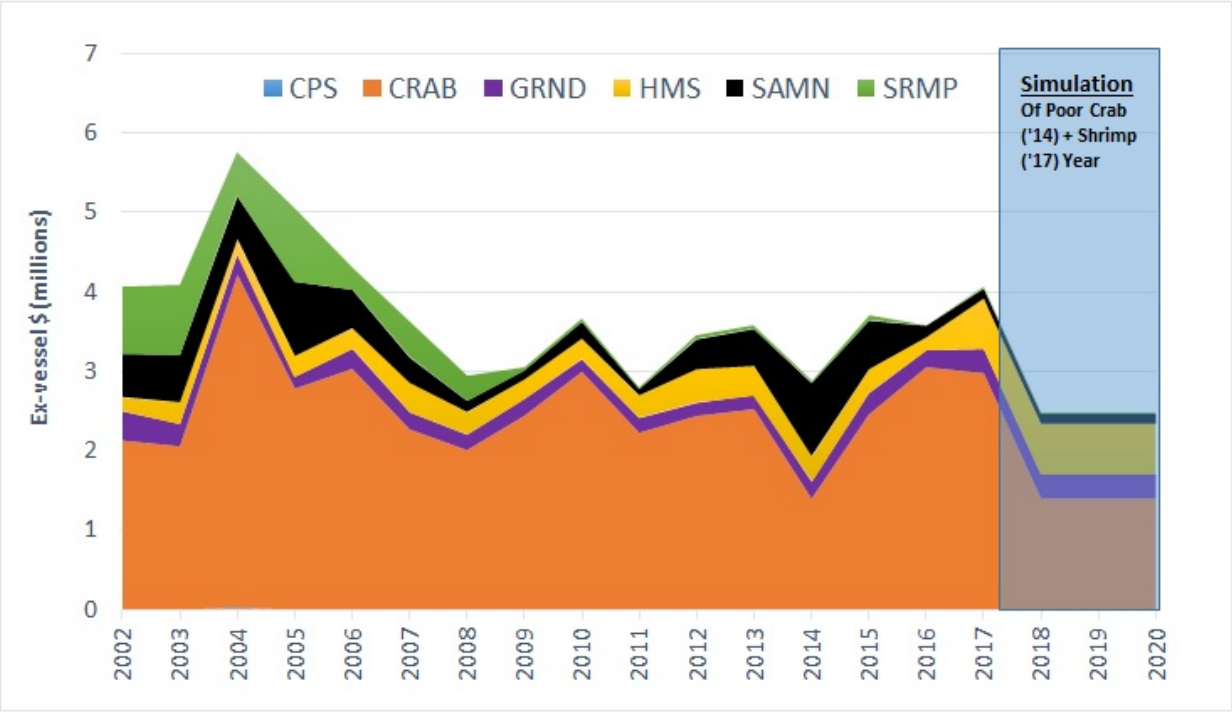

Figure B-28. Actual ex-vessel revenues for the port community of Tillamook (including Pacific City) in inflation adjusted $USD by fishery and in total, as well as the simulated total if there were future declines in the crab fishery without offsetting gains in others.

A main concern with Tillamook has been a decline in the diversity of commercial fisheries that contribute to the community; Tillamook is now 80 percent or more dependent on the crab fishery alone following

discontinuation of the trawl fishery in 2010, which used to contribute up to 20 percent or more of total revenues of mainly shrimp.

An increased dependence on the crab fishery is problematic for the economic welfare of Tillamook since the crab fishery is cyclical and prone to sharp decline. For instance, there was a sharp one-third decline in 2014 crab revenues that could have resulted in a $1 million overall loss had there not been an offsetting gains from a record high salmon fishery that year. If future declines in the crab fishery were to occur, it is unlikely that the other Tillamook fisheries could help offset the loss as salmon did in 2014. That is because: (1) salmon seasons are expected to remain poor in the future (2) their nearshore and sablefish groundfish fisheries are already at full capacity; and (3) although tuna (HMS) fisheries can absorb growth in good years, tuna is not a reliable substitution source since they are prone to cyclical downturns.

Declines in crab fisheries have already caused recent reductions in overall commercial revenues for California ports (see next sections) due to not having other fisheries to offset losses, and the same also occurred for the adjacent Oregon port of Astoria in 2017 (i.e., crab declines were responsible for ~$10 million of ~$30 million overall loss). But unlike these ports where overall declines have occurred, Tillamook has not yet had a sharp decline in crab during the recent years when CPS, shrimp, and salmon have been down; therefore, a simulation was used to project the potential negative future effects to Tillamook if a crab decline were to occur. The simulation used poor recent shrimp and crab years that have occurred in the recent past (e.g., 2014 for crab) and assumed revenues from the other fisheries would remain the same as in 2017. A down shrimp year is not applicable to Tillamook since they no longer have a trawl fishery, but was used for consistency with simulations in other Oregon ports that do (e.g., Coos Bay).

If Tillamook were to experience a down crab year in the future as has recently occurred in other ports, then the overall commercial fishery revenues could decrease by $1.5 million and 40 percent compared to 2011–17 levels, which have ranged from ~$3–4 million per year.

With the potential 40 percent reduction in future Tillamook total revenues ($1.5 million) if a downturn of crab were to occur, the only available opportunity for these communities would be through attainments of underutilized fixed gear groundfish stocks constrained by yelloweye rockfish, which are estimated to be worth ~$20.6 million in ex-vessel revenue. No trawl benefits would be expected since the trawl industry left the community in 2010, and would not be expected to return given recent trends in processor consolidation to larger revenue ports (e.g., Astoria). As discussed in the overarching trawl and fixed gear sections, the higher Alternatives 1 and 2 would provide greater economic benefits than No Action. As demonstrated in the fixed gear section, during the next eight years when the stock rebuilds under No Action (2019–26), the projected ex-vessel revenue gain for No Action is +5 million, +15 million Alternative 1, and +28 million for Alternative 2.

However, there may not be much, if any, additional benefits for the Tillamook ports of Garibaldi and Pacific City under No Action since all the shelf rocky reef where lingcod and mid-water rockfishes reside occurs within the closed occurs within the closed non-trawl RCA (Figure B-29). The Tillamook fixed gear fleet will continued to be constrained unless the non-trawl RCA boundaries are changed to provide opportunity to increase attainments of lingcod and mid-water rockfishes. RCA re-openings of this scope would not be possible under No Action, which barely covers year-to-year volatility (“boom-busts”) of yelloweye rockfish bycatches with baseline regulations. Alternatives 1, and especially 2, would be needed to consider any changes to the non-trawl RCA in a future process.

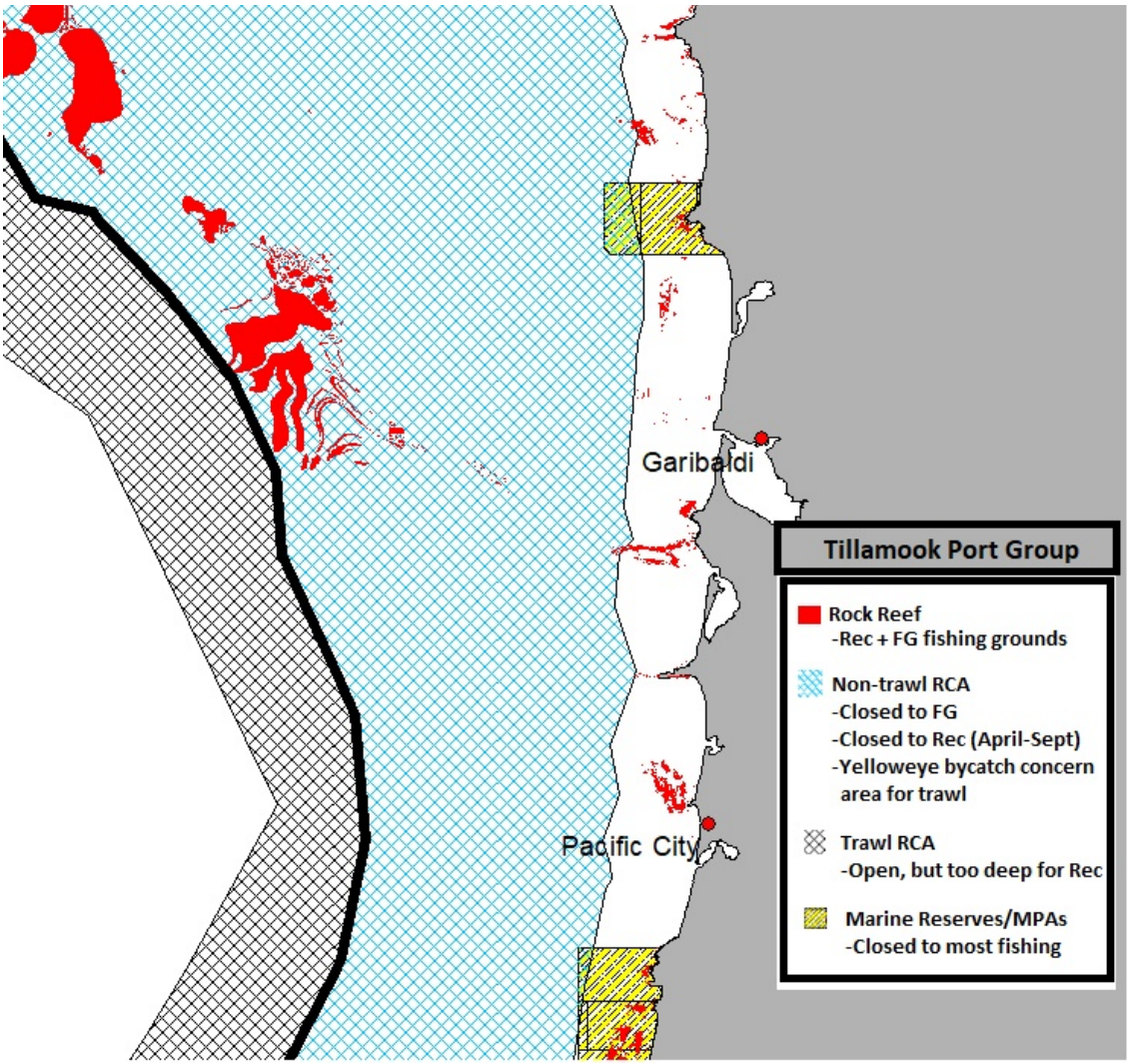

Figure B-29. Map of the rocky reef fishing grounds (red) where the Tillamook fixed gear fishery and recreational fishery would need to fish in order to increase opportunity for lingcod and mid-water rockfishes, but are closed due to occurring within the depth restriction. The non-trawl RCA that is closed from 30–100 fm is equivalent to the > 30 fm state recreational depth closure from April-Sept.

Recreational

The 40 fm federal seasonal depth restriction necessary to reduce yelloweye rockfish impacts had a minor impact to Garibaldi. However, when the fishery has been further restricted to inside of 20 fm through inseason action (as in 2010 and 2011) due to yelloweye rockfish impacts tracking high, the majority of the reef structure out of Garibaldi was closed off. Rockfish, and to some extent lingcod, inhabit areas with structure, such as reefs, as opposed to flat featureless bottom. Beginning in 2012 continuing through 2018, the state of Oregon has implemented a 30 fm seasonal depth restriction through state rules, as a reaction to increasing yelloweye rockfish encounters. This has closed a large portion of the reef structure for six months out of the year, forcing anglers to fish in concentrated areas. Prior to the seasonal depth restriction there were 9–10 active charter vessels operating out of Garibaldi. This number has decreased to five annually in 2010 through 2017.

B.5.5.3 Newport (including Depoe Bay)

Commercial

The story for the Newport port group, which includes Depoe Bay, has been very similar to the one described in detail above for Astoria: (1) it's one of the largest, most diversified West Coast ports; (2) overall commercial fishery ex-vessel revenues have been at their highest since 2011; and (3) there have been sharp recent declines in shrimp (2017) and salmon (2015-current) ex-vessel revenues.

The main difference is that Newport has not experienced the same sharp declines in 2016–17 total ex-vessel revenues as occurred in Astoria where there was a ~$30 million reduction (Figure B-30). The main reasons Newport did not have the same declines are: (1) the 2016–17 crab fishery hit record highs in Newport, as opposed to down ~$10 million per year for Astoria; (2) Newport does not have a CPS fishery (aside from some small-scale, one-time herring landings in 2016), as opposed to Astoria that has experienced $6-12 million in CPS losses mainly attributed to the sardine crash.

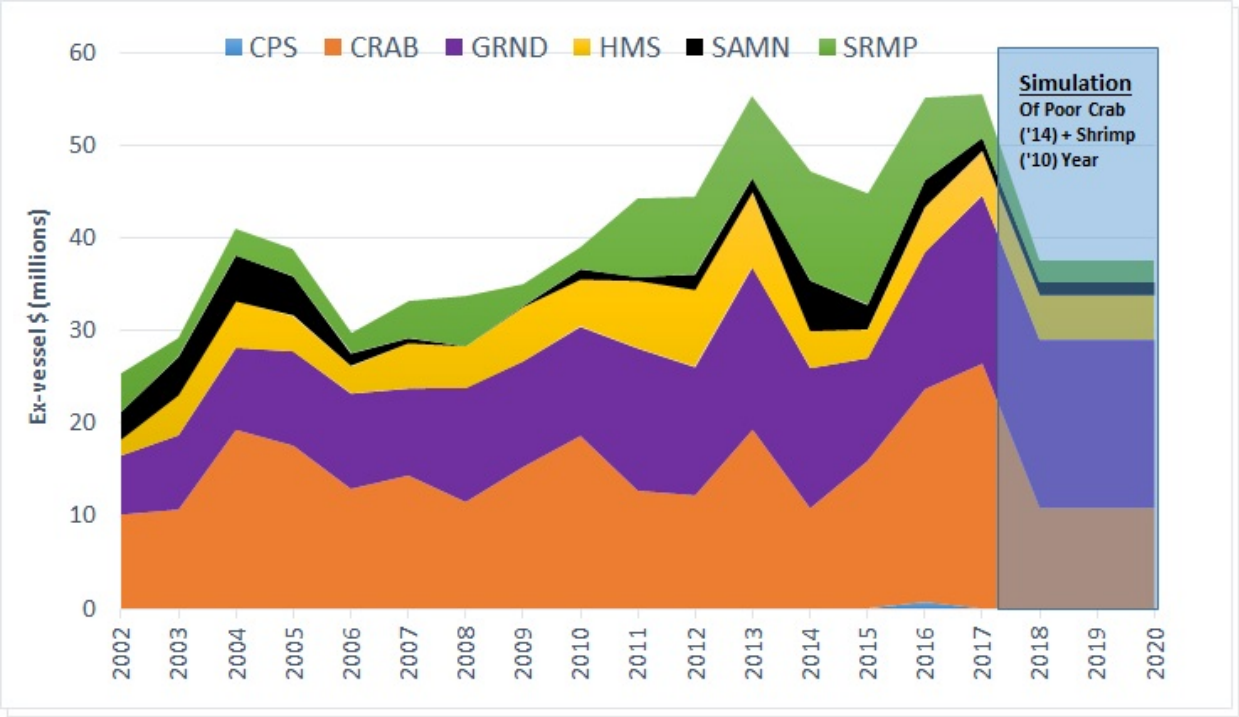

Figure B-30. Actual ex-vessel revenues for the port community of Newport (including Depoe Bay) in inflation adjusted $USD by fishery and in total, as well as the simulated total if there were future declines in the crab and shrimp fishery without offsetting gains in others.

Newport is therefore more similar to Tillamook in that the recent 2016–17 record high crab landings have masked the declines in other non-groundfish fisheries. Therefore, a simulation was also done for Newport to evaluate the potential effects of a future decline in the crab and shrimp fisheries while the other non-groundfish fisheries remain poor. Also simulating a decline in the shrimp fishery is important for Newport since it is one of the main contributing fisheries to the community, and because the 2018 pink shrimp forecast is poor (i.e., an absence of legal size older ages classes has been reported by fishery managers).

The simulation shows that the community of Newport could be vulnerable to a 30 percent reduction in total commercial fishery revenues if the crab and shrimp fisheries were to decline in future years while the other non-groundfish fisheries remain down. This is based on the simulated total of $38 million being 30 percent less than 2011–17 recent totals that have been upwards of ~$55 million.

With the potential $17 million or 30 percent reduction possible in the future for Newport if downturns of crab and shrimp were to occur, the only available opportunity for these communities would be through attainments of underutilized groundfish stocks constrained by yelloweye rockfish, which are estimated to be worth ~$24 million in ex-vessel revenue. As discussed in the overarching trawl and fixed gear sections, the higher Alternatives 1 and 2 would provide greater economic benefits than No Action. Alternatives 1 and 2 would be expected to result in higher attainments of lingcod and other trawl stocks due to increased market flow of yelloweye rockfish QPs and reduced consequences and mitigate some concerns of catching yelloweye rockfish. As demonstrated in the fixed gear section, during the next eight years when the stock rebuilds under No Action (2019—26), the projected ex-vessel revenue gain for No Action is +5 million, +15 million Alternative 1, and +28 million for Alternative 2.

However, there may not be much, if any, additional benefits for the Newport ports that include Depoe Bay under No Action since all the shelf rocky reef where lingcod and mid-water rockfishes reside occurs within the closed occurs within the closed non-trawl RCA (Figure B-31). The Newport fixed gear fleet will continued to be constrained unless the non-trawl RCA boundaries are changed to provide opportunity to increase attainments of lingcod and mid-water rockfishes. RCA re-openings of this scope would not be possible under No Action, which barely covers year-to-year volatility ("boom-busts") of yelloweye rockfish bycatches with baseline regulations. Alternatives 1, and especially 2, would be needed to consider any changes to the non-trawl RCA in a future process.

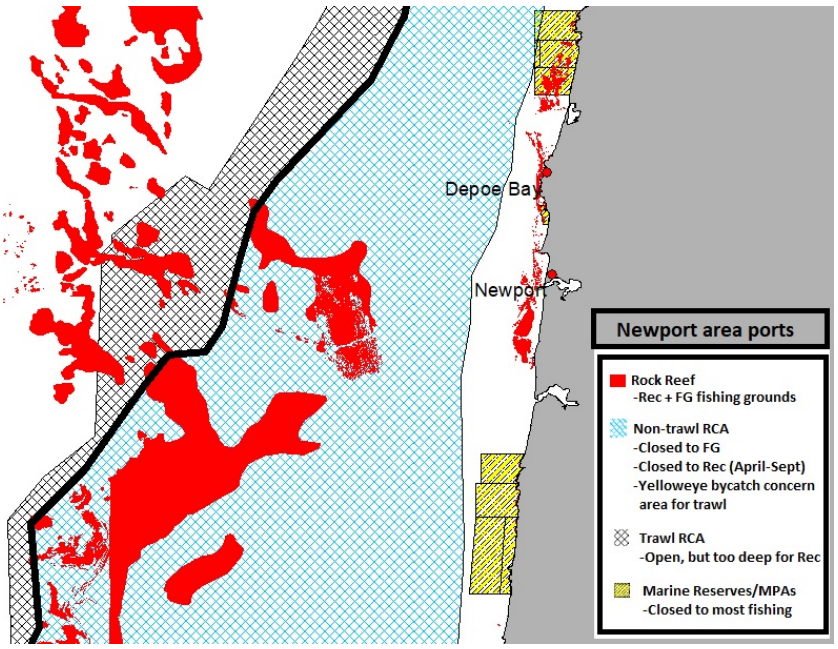

Figure B-31. Map of the rocky reef fishing grounds (red) where the Newport fixed gear fishery and recreational fishery would need to fish in order to increase opportunity for lingcod and mid-water rockfishes, but are closed due to occurring within the depth restriction. The non-trawl RCA that is closed from 30–100 fm is equivalent to the > 30 fm state recreational depth closure from April–Sept.

Recreational

The ports of Depoe Bay and Newport have been less impacted by the seasonal depth restrictions than other Oregon ports. There is significant reef structure inside of not only 40 fm, but 30 fm as well. During all-depth months, many anglers targeting groundfish fish shallower than 25 fm out of these ports. However there is regular interest in targeting deep water lingcod. No Action would likely have little impact on these two ports. Alternatives 1 and 2 would allow for some additional opportunity to target more offshore species as well as the deep water lingcod, reducing pressure on the more nearshore species, which would also reduce the potential for a premature closure of the fishery.

B.5.5.4 Winchester Bay and Florence

Commercial

The ports of Florence and Winchester Bay are heavily dependent upon the crab fishery, which can comprise up to 90 percent of total commercial fishery revenues. A simulation was not needed to evaluate the effects of a downturn in the crab fishery in regards to total revenues because the effects of crab "boom-and-busts" have been very apparent in the past. If the crab fishery is good, then overall revenues can reach $3.5-$4.5 million as occurred in 2014 and 2017, respectively (Figure B-32). If the crab fishery declines, then overall revenues can drop below $1 million as occurred in 2008 and 2009.

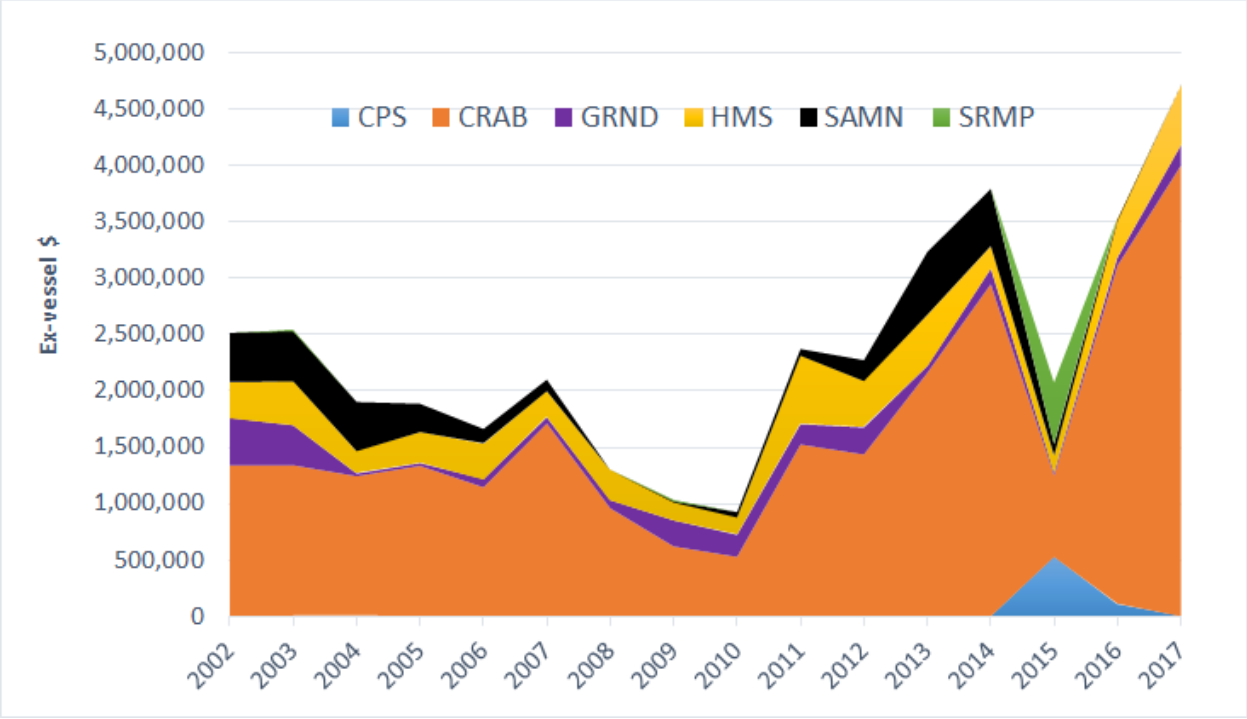

Figure B-32. Actual ex-vessel revenues for the port community of Florence and Winchester Bay (in inflation adjusted $USD) by fishery and in total.

This means that overall commercial ex-vessel revenues in Florence and Winchester Bay can increase or decrease by possibly 80 percent or more in short time periods. The impacts of such high degrees of volatility from year-to-year is not well known to these communities, but is generally not considered a positive for maintaining steady wages and jobs for harvesters, processors, fishing support businesses, and

communities in general. However, the fishing industry has continued to exist throughout the ups and downs so far and may be resilient to future downturns in the fishery.

Alternatives 1 and 2 could be beneficial for Winchester Bay and Florence since the higher allocations could result in reopening of their shelf rocky reefs that are currently closed to the non-trawl RCA, which could increase their attainments of lingcod and shelf rockfish (Figure B-33). This would be beneficial since it could help boost and diversify their fisheries. However, it is uncertain if fixed gear fishery would develop in these communities in response to higher groundfish opportunity as there has been practically no groundfish activity aside from some small amounts of sablefish landings since 2002. The lack of historical fixed gear groundfish could have been attributed to not having any open rocky reefs close to port. While the other Oregon ports have reef structure in the open nearshore depths of 0-30 fm that support recreational and nearshore fixed gear fisheries, Winchester Bay and Florence have practically none. Since their shelf reefs are closed to the non-trawl RCA, they have to travel about ~35 miles offshore to reach the nearest open fishing grounds seaward of the RCA. Given access to the shelf reefs that are only 15 miles away, but are currently closed to the non-trawl RCA, could be enough to prompt development of a shelf fixed gear fishery.

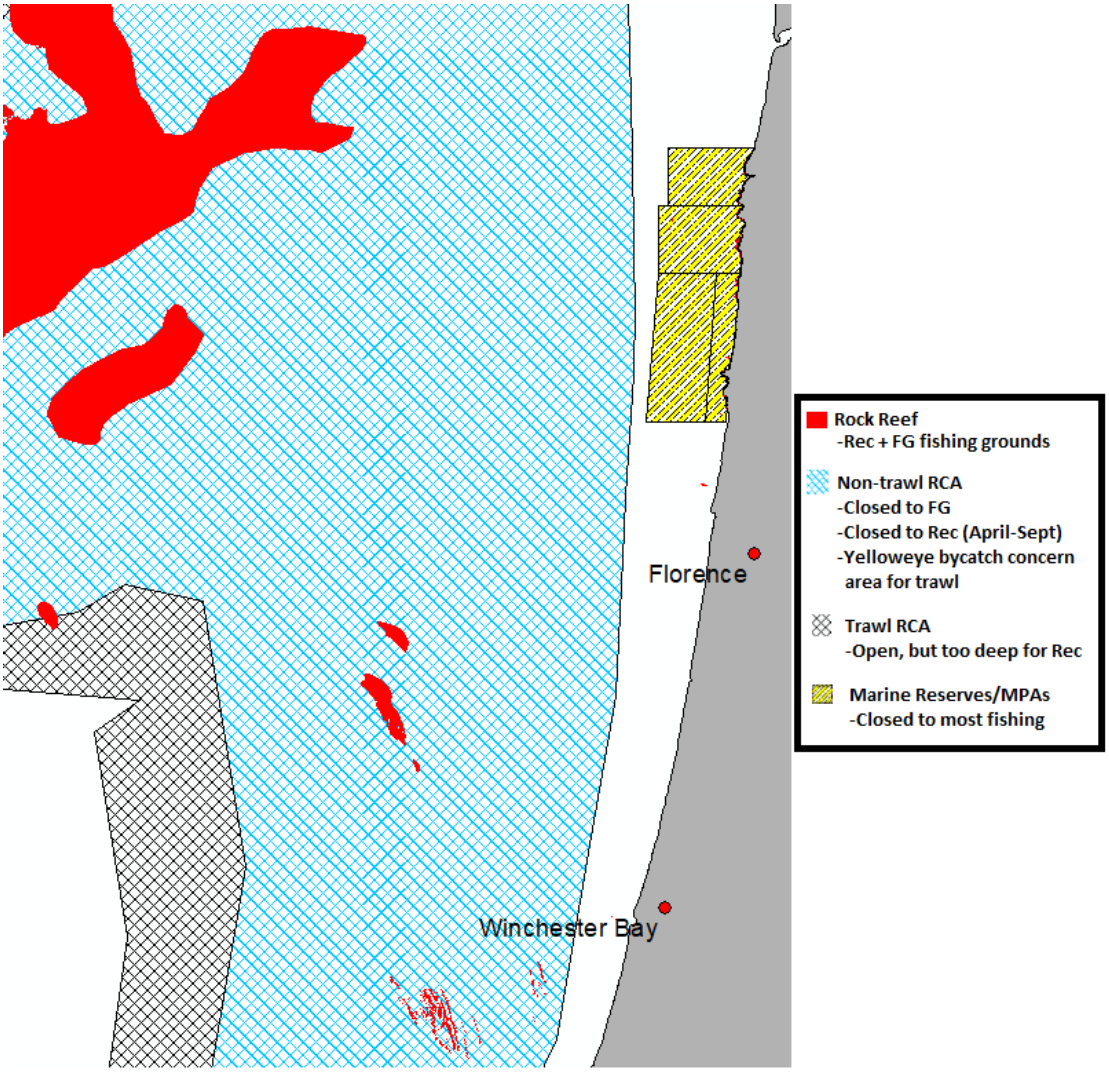

Figure B-33. Map depicting the near complete closure of the fishing grounds for the fixed gear and recreational groundfish fisheries in the areas surrounding Florence and Winchester Bay, Oregon. The nearshore depths of 0-30 fm remain open that extend from the blue shading to shore, but there is minimal rocky fishing grounds in that area.

Recreational

Winchester Bay, Oregon was particularly impacted by coastwide depth restrictions (shallower than 40 fm in federal rule), that were implemented in 2004 to limit the catch of yelloweye rockfish which remain in place through 2018. These restrictions closed off all of the available reef structure (there is no reef structure in the area shoreward of 40 fm). Rockfish, and to some extent lingcod, inhabit areas with structure, such as reefs, as opposed to flat featureless bottom. Prior to the depth restriction, there were 12-15 active charter vessels operating out of Winchester Bay. Since 2006, there has not been a charter bottomfish trip out of Winchester Bay. Prior to 2006, in most years there were several hundred private bottomfish trips; since 2006, there have been less than 100 trips annually. Between 2001 and 2006, bottomfish angler trips contributed $8,000 to $66,000 of income and 0.4 to 1.2 jobs to Winchester Bay, which has a population less than 400. Since 2007, bottomfish trips have contributed less than $3,000 of income and 0 jobs total to Winchester Bay.

Under No Action, the increase in the Oregon recreational HG would not be enough to reinstate year-round all-depth fishing. Therefore the benefits from this alternative would be limited for Winchester Bay. Potential effort from adding April and September as all-depth months will likely not be enough to provide much relief for fishing related businesses. Alternatives 1 and 2 would allow for year-round all-depth fishing. Potential effort from year-round all-depth fishing could help provide relief to fishing related business and the overall community. Additionally Alternatives 1 and 2 would allow for opportunity to target more offshore species as well as the deep water lingcod, reducing pressure on the more nearshore species, which would also reduce the potential for a premature closure of the fishery.

B.5.5.5 Coos Bay

Commercial

The story for the Coos Bay port group which includes Bandon has been similar to that of Newport (Figure B-34): (1) overall commercial ex-vessel revenues have been at high and relatively stable levels since 2010 (i.e., ~$32-$39 million per year for Coos Bay); (2) there have been sharp declines in the salmon fisheries (i.e., was $3-$6 million per year from 2013–15 in Coos Bay and has dropped to $0.3 million in 2017, which is a 95 percent reduction; and (3) there have also been sharp declines in the shrimp fishery (was $8-$12 million per year from 2012–16 and has dropped to $5 million in 2016–17, a ~60 percent reduction); and (4) record high crab revenues in 2016–17 ($15 million and $18 million, respectively) have helped offset losses in the shrimp and salmon fisheries, which has kept overall revenues relatively stable.. Furthermore, the record high crab revenues have also helped offset losses in the Coos Bay groundfish trawl fishery stemming from adoption of the IFQ program that were described in detail in the 5 Year Catch Shares Program Review Report.

Since the record high crab revenues 2016–17 are masking the effects of downturns in the shrimp, salmon, and groundfish fisheries, a simulation was done to evaluate the effects of a future downturn in crab revenues for the community for Coos Bay. If these fisheries were to remain poor and crab dropped to much lower levels such as occurred in 2008, then the overall commercial fishing revenues could be reduced to ~$16 million, which would be around 50 percent reduction from the recent range of ~$32-$39 million per year since 2010. If crab was instead decrease to more intermediate levels such as the ~$14 million per year that occurred from 2011–15, then the overall total could be reduced to ~$23 million, which would be a one-third reduction instead of the one-half reduction with a very poor crab year.

With a loss of ~$10-$20 million possible in the future for Coos Bay depending on how the crab fishery turns out and if downturns in salmon, shrimp, groundfish fisheries were to remain (as expected), the only available opportunity for these communities would be through attainments of underutilized groundfish stocks constrained by yelloweye rockfish, which are estimated to be worth ~$24 million in ex-vessel revenue. As discussed in the overarching trawl and fixed gear sections, the higher Alternatives 1 and 2 would provide greater economic benefits than No Action. Alternatives 1 and 2 would be expected to result in higher attainments of lingcod and other trawl stocks due to increased market flow of yelloweye rockfish QPs and reduced consequences and mitigate some concerns of catching yelloweye rockfish. As demonstrated in the fixed gear section, during the next eight years when the stock rebuilds under No Action (2019–26), the projected ex-vessel revenue gain for No Action is +5 million, +15 million Alternative 1, and +28 million for Alternative 2.

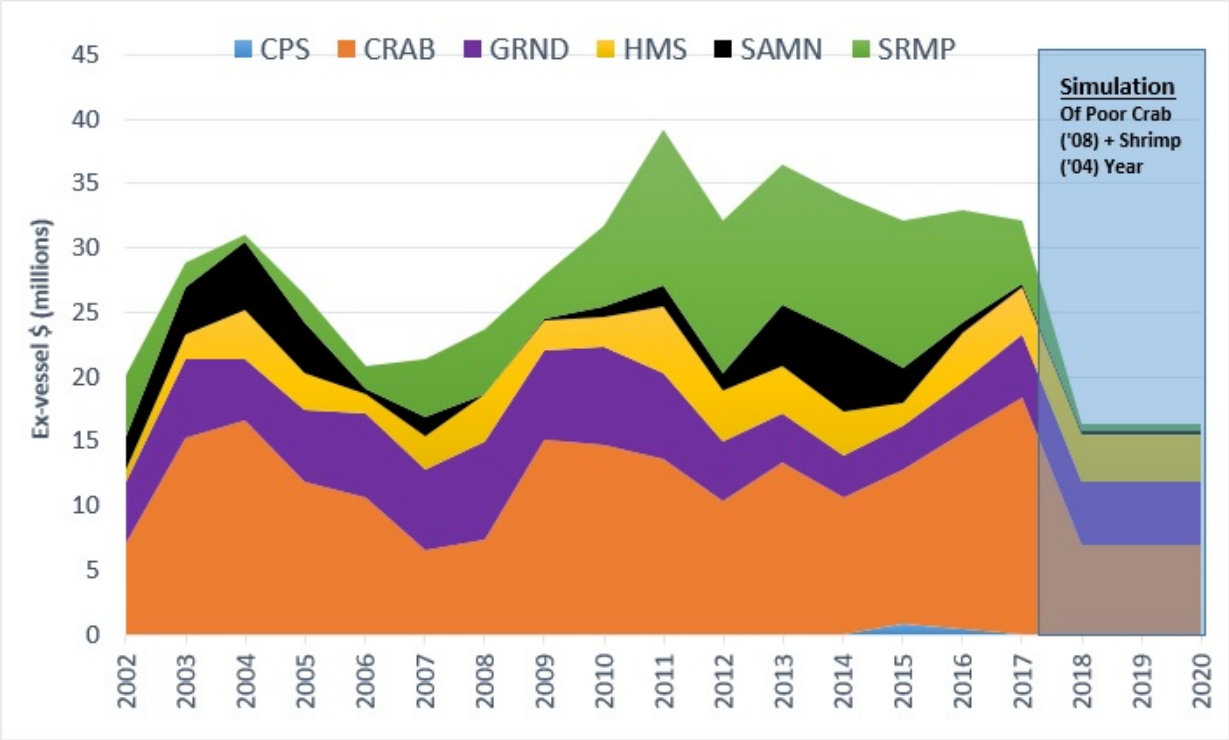

Figure B-34. Actual ex-vessel revenues for the port community of Coos Bay (inflation adjusted $USD) by fishery and in total, as well as the simulated total if there were future declines in the Dungeness crab and pink shrimp fisheries.

However, there may not be much, if any, additional benefits for the Coos Bay ports under No Action since the shelf rocky reef where lingcod and mid-water rockfishes reside occurs within the closed occurs within the closed non-trawl RCA (Figure B-33). The Coos Bay fixed gear fleet will continued to be constrained unless the non-trawl RCA boundaries are changed to provide opportunity to increase attainments of lingcod and mid-water rockfishes. RCA re-openings of this scope would not be possible under No Action, which barely covers year-to-year volatility ("boom-busts") of yelloweye rockfish bycatches with baseline regulations. Alternatives 1, and especially 2, would be needed to consider any changes to the non-trawl RCA in a future process.

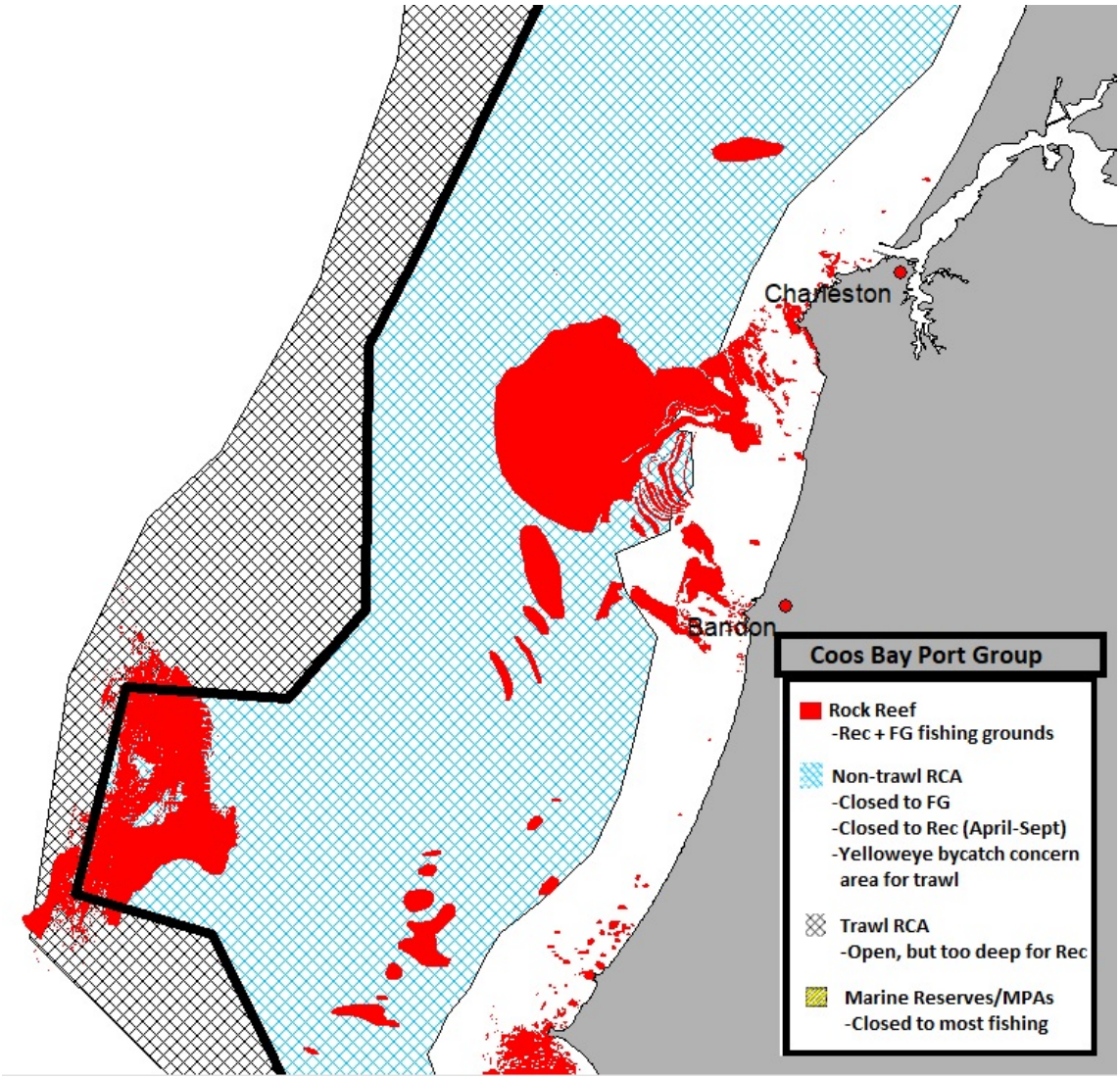

Figure B-35. Map of the rocky reef fishing grounds (red) where the Coos Bay fixed gear fishery and recreational fishery would need to fish in order to increase opportunity for lingcod and mid-water rockfishes, but are closed due to occurring within the depth restriction. The non-trawl RCA that is closed from 30-100 fm is equivalent to the > 30 fm state recreational depth closure from April-Sept.

Recreational

The 40 fm federal seasonal depth restriction necessary to reduce yelloweye rockfish impacts had a minor impacts to Charleston and Bandon. There is reef structure shallower than 40 fm, however it did close off some popular fishing locations. Similar to Newport and Depoe Bay, No Action is likely to have little impact to these ports. Alternatives 1 and 2 and the associated depth liberalizations could help take some pressure off of the more nearshore species such as black, copper, quillback and China rockfish as well as cabezon, and shift some effort to the more offshore species which would reduce the potential for an early closure.

B.5.5.6 Brookings

Commercial

The port grouping of Brookings also contains Port Orford and Gold Beach, which all feature fixed gear fisheries but only Brookings has a trawl fishery. Overall commercial ex-vessel revenues have been volatile since 2011 and ranged from ~$12-$23 million per year (Figure B-36). This volatility has been due to Brookings being 50-80 percent reliant on "boom-bust" crab, shrimp, and salmon fisheries, which have exhibited large upturns and downturns in recent years. The effects of large increases and decreases in overall commercial revenues to Brookings are not well known, but volatility is generally considered counterproductive for maintaining steady jobs and wages.

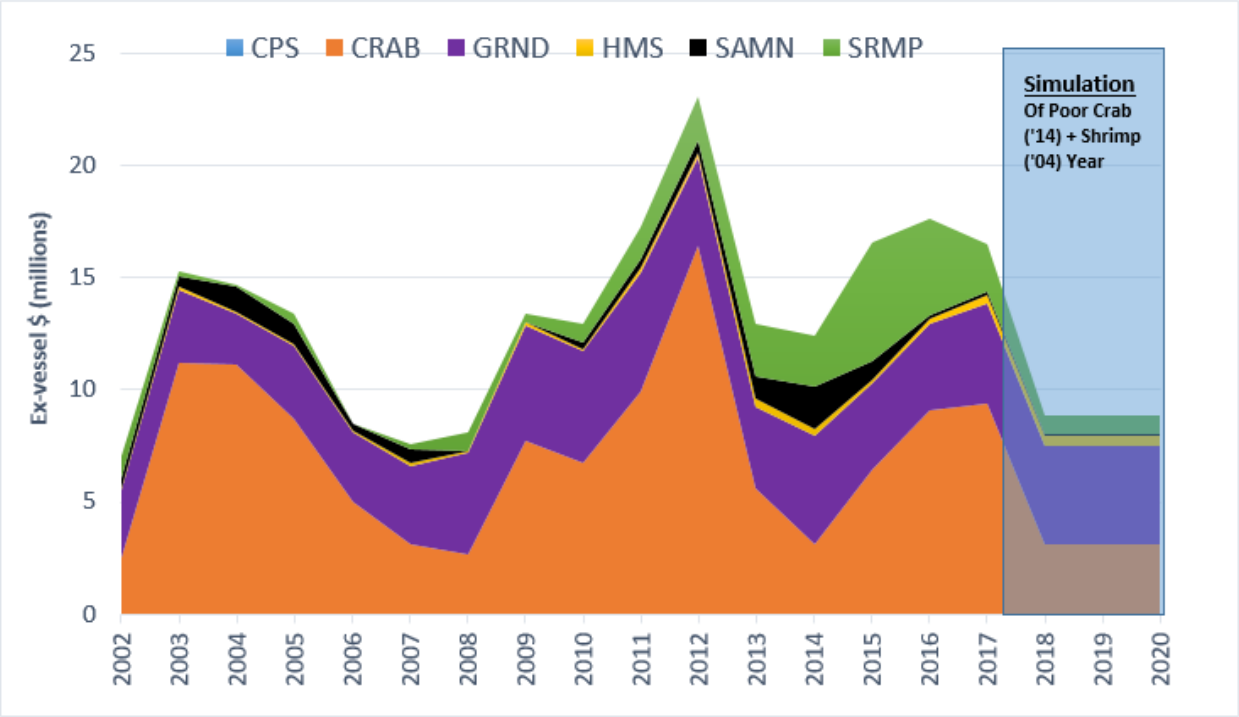

Figure B-36. Actual ex-vessel revenues for the port community of Brookings (inflation adjusted $USD) by fishery and in total, as well as the simulated total if there were future declines in the Dungeness crab and pink shrimp fisheries.

The main point of concern for Brookings is the same as described above for Coos Bay: while recent highs in crab and shrimp have offset declines in salmon, future decreases of crab and/or shrimp to lower levels could negatively impact overall future revenues. For instance, overall revenues have been steady at ~$16 million per year from 2015–17, but could decline to ~$9 million with poor shrimp and crab years (see simulation of Figure B-36 or decline to ~$14 million with a mediocre crab season (e.g., 2009–10) and a poor shrimp fishery. As described above, the 2018 pink shrimp season is projected to be poor due to lack of legal size year classes.

With a loss of ~$3-7 million possible in the future for Brookings, the only available opportunity for these communities would be through attainments of underutilized groundfish stocks constrained by yelloweye rockfish, which are estimated to be worth ~$24 million in ex-vessel revenue. As discussed in the overarching trawl and fixed gear sections, the higher Alternatives 1 and 2 would provide greater economic benefits than No Action. Alternatives 1 and 2 would be expected to result in higher attainments

of lingcod and other trawl stocks due to increased market flow of yelloweye rockfish QPs and reduced consequences and mitigate some concerns of catching yelloweye rockfish. As demonstrated in the fixed gear section, during the next eight years when the stock rebuilds under No Action (2019–2026), the projected ex-vessel revenue gain for No Action is +5 million, +15 million Alternative 1, and +28 million for Alternative 2.

However, there may not be much, if any, additional benefits for Port Orford of the Brookings port group under No Action since the shelf rocky reef where lingcod and mid-water rockfishes reside occurs within the closed occurs within the closed non-trawl RCA (Figure B-37). The Port Orford fixed gear fleet will continued to be constrained unless the non-trawl RCA boundaries are changed to provide opportunity to increase attainments of lingcod and mid-water rockfishes. RCA re-openings of this scope would not be possible under No Action, which barely covers year-to-year volatility ("boom-busts") of yelloweye rockfish bycatches with baseline regulations. Alternatives 1, and especially 2, would be needed to consider any changes to the non-trawl RCA in a future process. Benefits for the fixed gear fisheries of Brookings and Gold Beach are expected to be less than for Port Orford since there is little if any deep reefs near these ports.

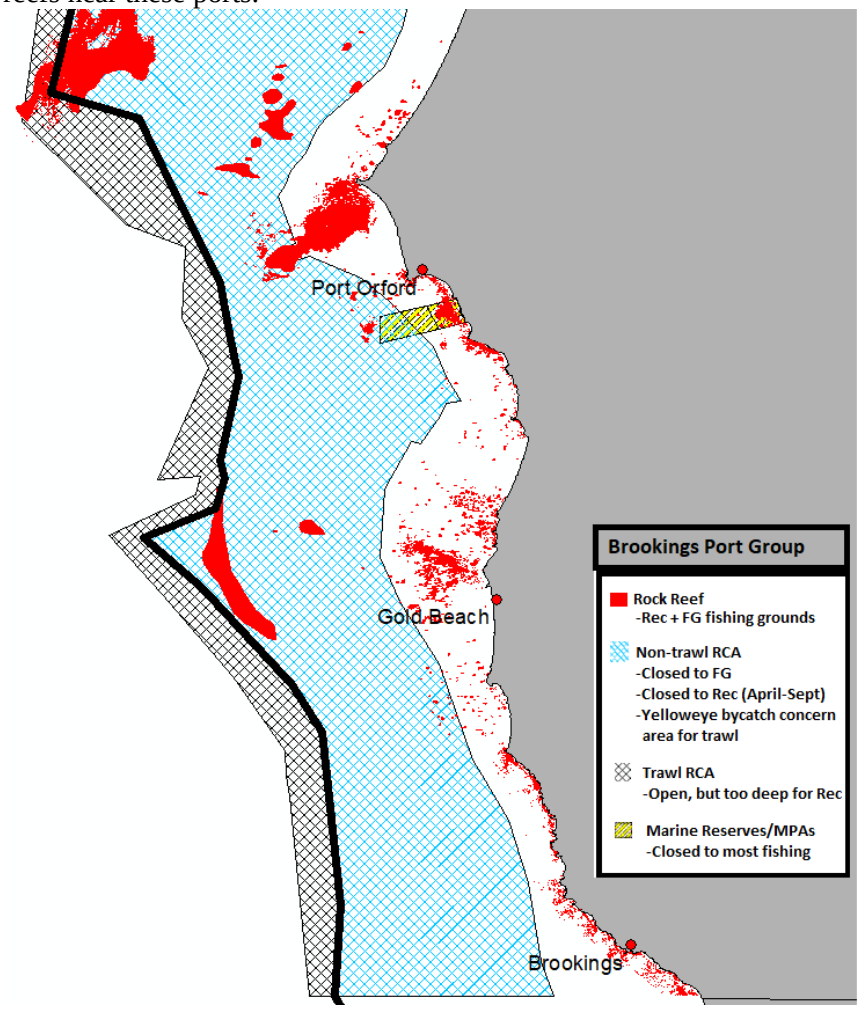

Figure B-37. Map of the rocky reef fishing grounds (red) where the Brookings fixed gear fishery and recreational fishery would need to fish in order to increase opportunity for lingcod and mid-water rockfishes, but are closed due to occurring within the depth restriction. The non-trawl RCA that is closed from 30–100 fm is equivalent to the > 30 fm state recreational depth closure from April-Sept.

Recreational

The port of Brookings has been the hardest hit of the Oregon ports by recent downturns in salmon. Brookings is within the Klamath Management Zone, which had no recreational Chinook salmon fishing in 2017. Even when there are salmon fishing opportunities, Brookings normally has the second highest number of groundfish angler trips annually. There is little yelloweye rockfish habitat around Brookings, however since Oregon is managed as one unit, all of the regulations for the rest of the state apply in that area as well. The change in depth restriction and fewer months of restrictions under No Action would have limited impacts to Brookings. Under Alternatives 1 and 2, the additional liberalizations (year-round all-depth fishing) would take some pressure off of the more nearshore species such as black rockfish and cabezon, which would reduce the potential for an early closure.

B.5.6 California Communities

B.5.6.1 California Commercial Communities

California is comprised of 1,100 miles of diverse coastline. The more northern coastal communities are geographically isolated, sparsely populated, and have historically been the most dependent on natural resources (i.e., fisheries, logging). With high unemployment in these communities and declines in the timber industry, fisheries have played an increasingly important role in the local economies of these communities. Central and southern coastal communities also have a rich dependency on commercial fisheries while having vastly larger population, more infrastructure in some port complexes, and easy access to global markets (i.e., San Francisco Bay).

Since the late 1990s, several groundfish species were declared overfished that resulted in stringent management measures being implemented, however yelloweye rockfish has been the most constraining overfished species for the longest period of time, particularly for the California the commercial nearshore fishery north of 40° 10’ N. latitude and shelf fisheries south of 40° 10’ N. latitude. Yelloweye rockfish was, and is, particularly constraining to California communities from Crescent City south to Fort Bragg due to the geographic range of the species. Although yelloweye rockfish are found as far south as Baja California, they are most abundant from southeast Alaska to central California (Love 2002). As in Washington and Oregon, conservative management accompanying the rebuilding for several species, including yelloweye rockfish, and capacity reduction plans contributed to the demise of many historic California trawl communities. Several trawl communities disappeared in the Point Arena and San Francisco areas after the capacity reduction accompanying the transition to catch share management in the trawl fishery in 2011 (observable in Figure B-38 below), as well as several communities south of Point Conception after 2005 (Five Year Review, pg. 3-204).

Over the last twenty years there have been large reductions in ex-vessel revenues from the ports in northern and central California (between 42°–34° 2’’ N lat.; Figure B-38). A notable decline in ex-vessel revenue is the 8.7 million dollar drop from 2006 to 2007, which occurred directly after the Amendment 16-4 “ramp-down” strategy went into place, reducing the yelloweye rockfish ACL from 27 mt to 23 mt in 2007. However, there were other management measures that were implemented to reduce bycatch of canary rockfish and petrale sole landings in the trawl fishery, and to reduce landings of state managed nearshore species (i.e., cabezon and greenling). Other events that possibly contributed to the downward trend in ex-vessel revenue in 2007 were the loss of six groundfish processors (2015-16 FEIS), the initial implementation of Marine Protection Areas (MPAs) along the CA coast, the vessel monitoring system (VMS) requirement extended to open access participants. Another notable decline in ex-vessel revenue was the 4 million dollar loss from 2011 to 2012. Although the 2011 rebuilding plan for yelloweye rockfish increase the ACL from 14 mt to 17 mt, the implementation of the Trawl Catch Shares Program

(Amendment 20) and the tsunami that struck the north coast in 2011 may have been major contributor to the loss in revenue. The average annual landings from the ports between the OR/CA border and Pt Conception (2011 to present) were 1,183 mt which are about 160 mt less than the average annual landings, 1,343 mt, from the "ramp-down" period (2007–10).

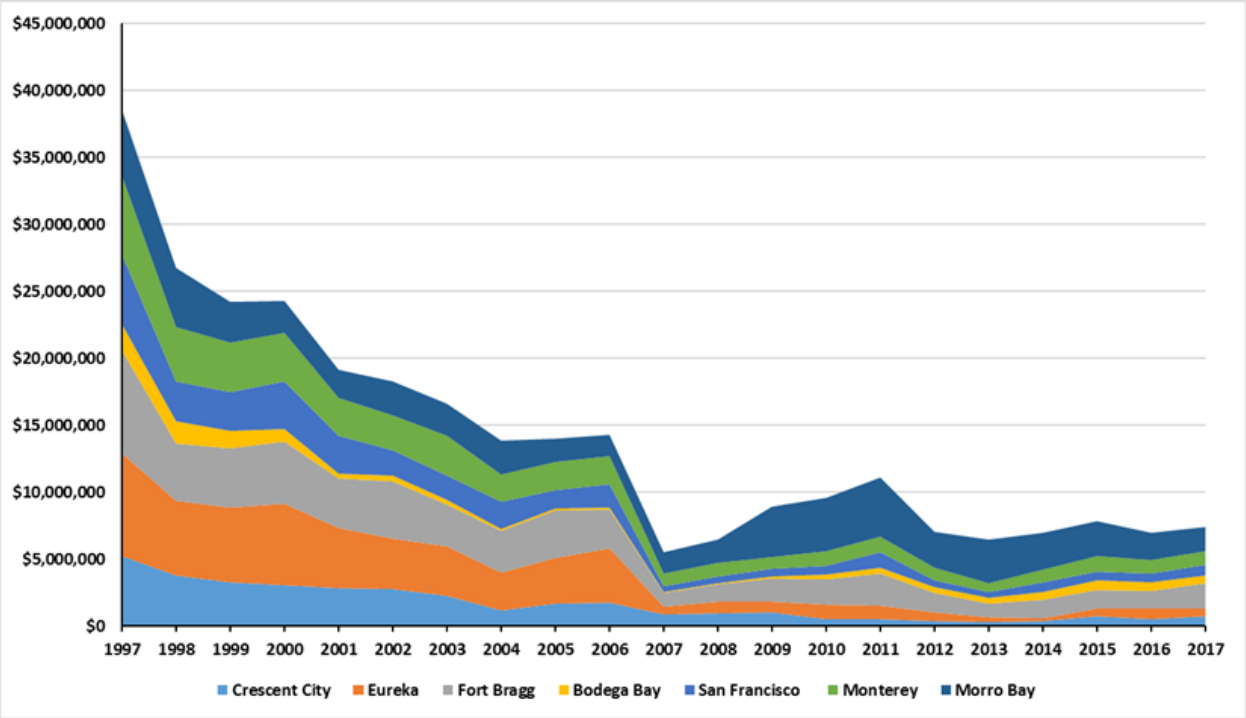

Figure B-38. Ex-vessel revenue, adjusted for inflation, for ports in California from 1997–2017. Data source: PacFIN.

Table B-18. Vulnerability and dependence in California fishing communities.

Community	Social Vulnerability	Recreational Dependence	Commercial Dependence
Crescent, CA	High	Moderate	High
Eureka, CA	Moderate	Moderate	High
Fort Bragg, CA	High	High	High
Bodega Bay, CA	Low	Low	High
San Francisco, CA	Low	High	High
Half Moon Bay, CA	Low	Moderate	High
Moss Landing, CA	High	High	High
Monterey, CA	Moderate	High	High
Morro Bay, CA	Moderate	High	High

(Source, Karma Norman/NWFSC Human Dimensions Program, see discussion of indicators above).

Between 42° and 40°10' North Latitude

The four ports in northern California, Crescent City, Trinidad, Eureka, and Fields Landings have a high dependency on the commercial fishing industry and rate moderate to high on the social vulnerability scale (Table B-18). The low yelloweye rockfish ACLs and allocations have limited access to target species in the commercial groundfish fishery, particularly in this region. The nearshore fishery is the primary groundfish fishery of the north coast, since the groundfish trawl fishery has greatly reduced, as a consequence of rebuilding plan for yelloweye rockfish and other overfished species, and outsized reductions in capacity reduction buybacks and catch share management relative to other states, in addition to other factors. Other primary commercial fishing opportunities on the north coast are Dungeness crab and salmon (Figure B-39). Many fisherman include Dungeness crab, salmon, and groundfish in their portfolio as a means to harvest year-round. However, when Dungeness crab and salmon seasons have been shortened or closed, as they were in 2015, participation has increased in the groundfish fishery.

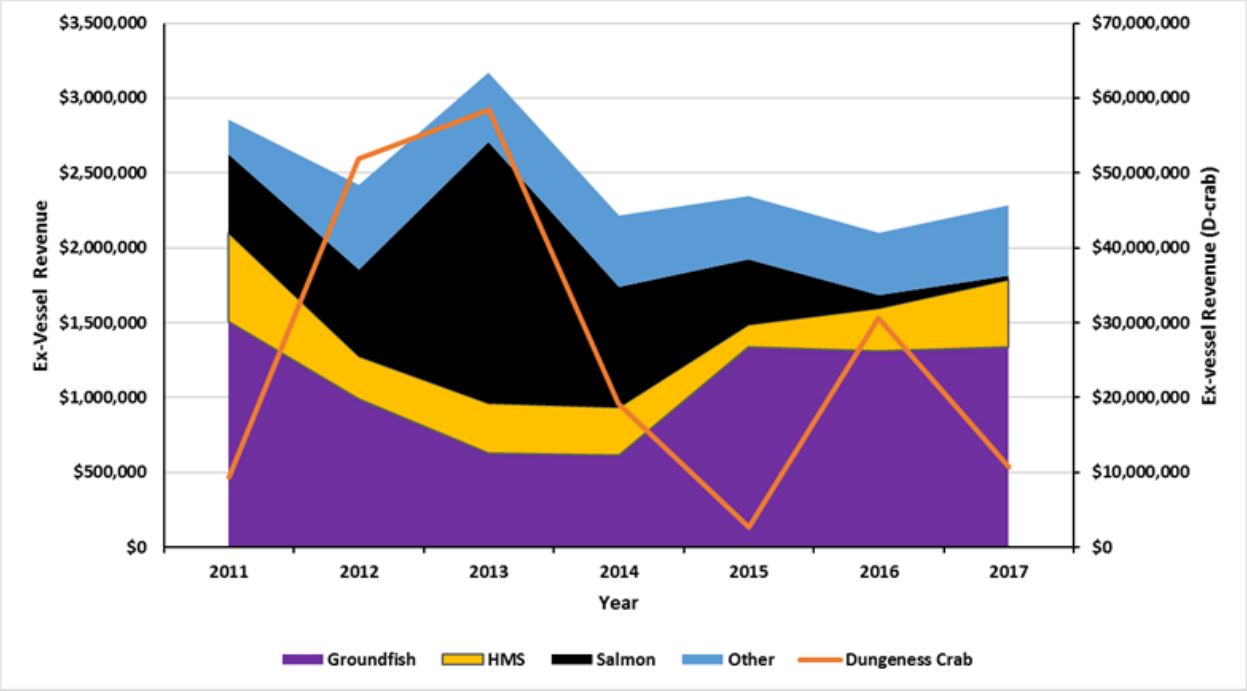

Figure B-39. Ex-vessel revenue, adjusted for inflation, by fishery from ports between 42° and 40°10' N lat. Dungeness crab shown on a secondary axis because the revenue generated by the fishery is much greater than the other fisheries. Other includes invertebrates, skates, rays, halibut, surfperch, white seabass, and yellowtail. Data source: PacFIN.

The GMT uses a Nearshore model is used to project impacts on yelloweye rockfish from harvesting/targeting the nearshore fishery. Under baseline conditions (2017), the CA nearshore fishery share of yelloweye rockfish is 0.7 mt. Even with the projected impacts from the PPA increased lingcod trip limits 42°–40°10’ N lat., the nearshore fishery is at 71 percent of the CA share of yelloweye rockfish. However, these impacts were modeled off a stable fishery. In 2018, some nearshore fishery permits were transferred and the fishery gained new participants for the first time since 2003 (more details below). If there is a an increase in effort from the new participants, especially in northern California, the 0.7 mt of yelloweye rockfish allocated to California would continue to limit access to target species in the nearshore fishery and likely result in trip limit reductions and possible closures (both time and area closures).

Under No Action, the CA nearshore share would be 0.9 mt. The extra 0.2 mt of yelloweye rockfish allows for some increases in landings in the nearshore fishery from new entrants, or, if the fishery remains stable, opportunities could include full attainment of state landing targets based on 2019–20 ACLs for black rockfish, nearshore rockfish (north and south of 40°10’ N lat.), and cabezon (Table B-19), or a possible change to the RCA[30] to provide access to deeper depths and shelf rockfish species. However, if the nearshore fishery gains several new entrants and there is as little as 10 percent increase in pressure in the deeper depths north of 40°10’ N lat., reductions in trip limits or closures may need to be evaluated and implemented through inseason action (Table B-20). Therefore, the 0.9 mt CA share of yelloweye rockfish could limit access to target species in the nearshore fishery if several new participants operate north of 40° 10' N lat. where the trip limits and interactions with yelloweye rockfish are significantly higher compared to south of 40° 10' N lat. The non-nearshore fishery is projected to remain within the

[30] Pending progress of the fishery, the Council could change the non-trawl RCA through another two-meeting process and modifications could be done within the biennium or over the life of the rebuilding plan.

yelloweye rockfish HG with the proposed increase in lingcod north of 40°10’ N lat. and projected mortality sablefish and slope and shelf rockfish. Additionally, the IFQ projections are within expected impacts for yelloweye rockfish.

Table B-19. Yelloweye rockfish projected impacts the CA nearshore fishery under all alternative and a no disruption (i.e., several new entrants) to the CA nearshore fishery.

Alternative	Nearshore YE HG (mt)	CA YE share (mt)	Projected YE impact (mt)	% of CA YE share
Baseline	2.0	0.7	0.5	71%
No Action 2019	3.3	0.9	0.5	59%
No Action 2020	3.4	0.9	0.5	57%
Alt 1 2019	4.7	1.3	0.5	41%
Alt 1 2020	4.8	1.3	0.5	41%
Alt 2 2019	5.8	1.6	0.5	34%
Alt 2 2020	6	1.6	0.5	32%

Table B-20. Yelloweye rockfish projected impacts in the CA nearshore fishery under all alternative and a 10 percent shift in effort to deeper depths (i.e., 20-30fm).

Alternative	YE Nearshore HG (mt)	CA YE share (mt)	Projected YE impact (mt)	% of CA YE share
Baseline	2.0	0.6	0.9	152%
No Action 2019	3.3	0.9	0.9	101%
No Action 2020	3.4	0.9	0.9	98%
Alt 1 2019	4.7	1.3	0.9	71%
Alt 1 2020	4.8	1.3	0.9	70%
Alt 2 2019	5.8	1.6	0.9	58%
Alt 2 2020	6	1.6	0.9	56%

Under Alternative 1 or 2, the CA nearshore fishery would gain an extra 0.6–0.9 mt of yelloweye rockfish compared to 2017. A 1.3 mt (Alt 1) or 1.6 mt (Alt 2) CA share of yelloweye rockfish would provide the most relief to the nearshore fishery north of 40° 10' N lat. the fishery has seen for almost ten years by allowing for new entrants, shifts in effort, and full attainment of CA nearshore HGs or adjustments to the non-trawl RCA. The non-nearshore and IFQ fisheries could see increases in landings of target species with the additional yelloweye rockfish allocations (discussion below).

The commercial take of nearshore rockfish (including black rockfish), cabezon, kelp greenling, and CA scorpionfish has been limited by a state restricted access program since 2003 with the use of two separate Nearshore Fishery Permits (deeper and shallow), which has resulted in relatively stable landings from a small percentage of permittees. Black rockfish and lingcod are primary targets due to the low biodiversity of nearshore rockfish off the north coast.

Over the past decade, access to target species in the nearshore fishery in northern California has been greatly restricted given the low yelloweye rockfish ACLs and associated allocations (or shares as is the case in the nearshore fishery). As per the 2006 Amendment 16-4 "ramp-down" strategy, the yelloweye rockfish ACL started with a decrease from 27 mt in 2006 to 23 mt in 2007. The following year, the yelloweye rockfish ACL decreased from 20 mt in 2008 to 17 mt in 2009, with a 1.1 mt yelloweye rockfish HG for the nearshore fishery. To reduce impacts on yelloweye rockfish, the Council, through inseason action in November 2008, moved the shoreward boundary of the non-trawl RCA from 30 to 20 fm north of 40°10' N lat. for the start of the start of the 2009 fishing season. Prior to moving the non-trawl RCA into 20 fm, from 2003–08, the nearshore fishery caught over 50 percent of their nearshore rockfish (comprised of ~3 percent of black rockfish, ~11 percent of blue rockfish, and ~40 percent of minor nearshore rockfish) and more than 20 percent of their lingcod in depths greater than 20 fm (2013-2014 Appendix B). During this time, the recreational RCA boundary line was also at 20 fm. Restricting the commercial fixed gear and recreational fisheries to the same depth greatly increased the fishing pressure on nearshore stocks.

In July of 2010, the ACL for yelloweye rockfish was reduced to 14 mt and the nearshore share of yelloweye rockfish remained at 1.1 mt. Reducing the yelloweye rockfish ACL to 14 mt resulted in reduction in harvested nearshore rockfish and ultimately closing of fish buyers and loss of homes for fishermen on the north coast (Agenda Item H.2.c Supplemental GAP report, March 2011). Participation north of 40°10' N lat. dropped from 28 vessels in 2008 down to 19 vessels in 2009 and 17 vessels in 2010. The nearshore fishery ex-vessel revenue (adjusted for inflation) decreased by 67 percent (-$223,149) from 2008 to 2009, and by three percent (-$215,562) from 2009 to 2010.

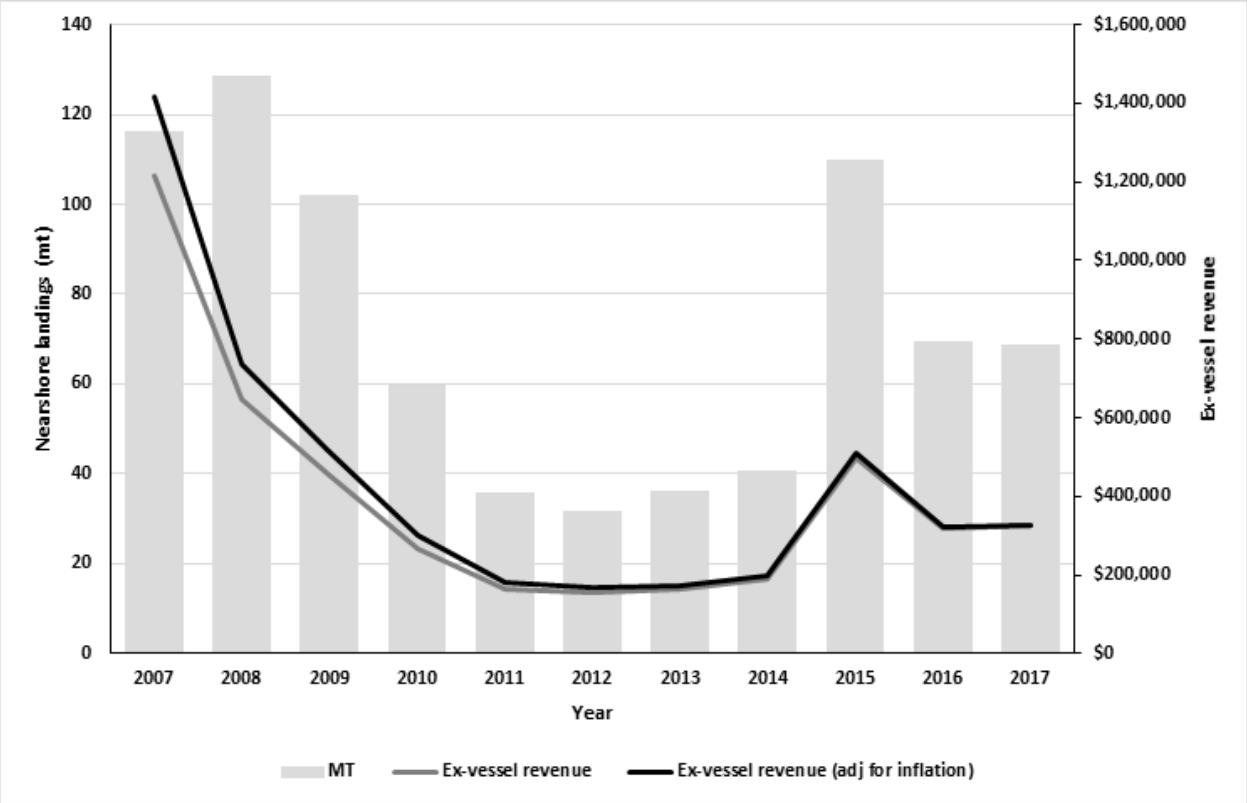

Figure B-40; Data source: PacFIN.

Although the yelloweye rockfish ACL increased to 17 mt for the 2011–12 biennium, the 2011 tsunami, particularly in Crescent City, compounded the economic losses already experienced in the nearshore fishery on the north coast. In December of 2012, the California Fish and Game Commission (FGC) implemented a total of 20 Marine Protected Areas (MPAs), covering approximately 137 mi^2 of state waters or about 13 percent of the area north of 40°10’ N lat., which further reduced the available fishing area for the nearshore fishery. By this time, participation dropped to 14 vessels in 2011 and 7 vessels in 2012. The nearshore fishery ex-vessel revenue decreased another 45 percent (-$118,531) from 2010 to 2011, and again by 88 percent (-14,007) from 2011 to 2012.

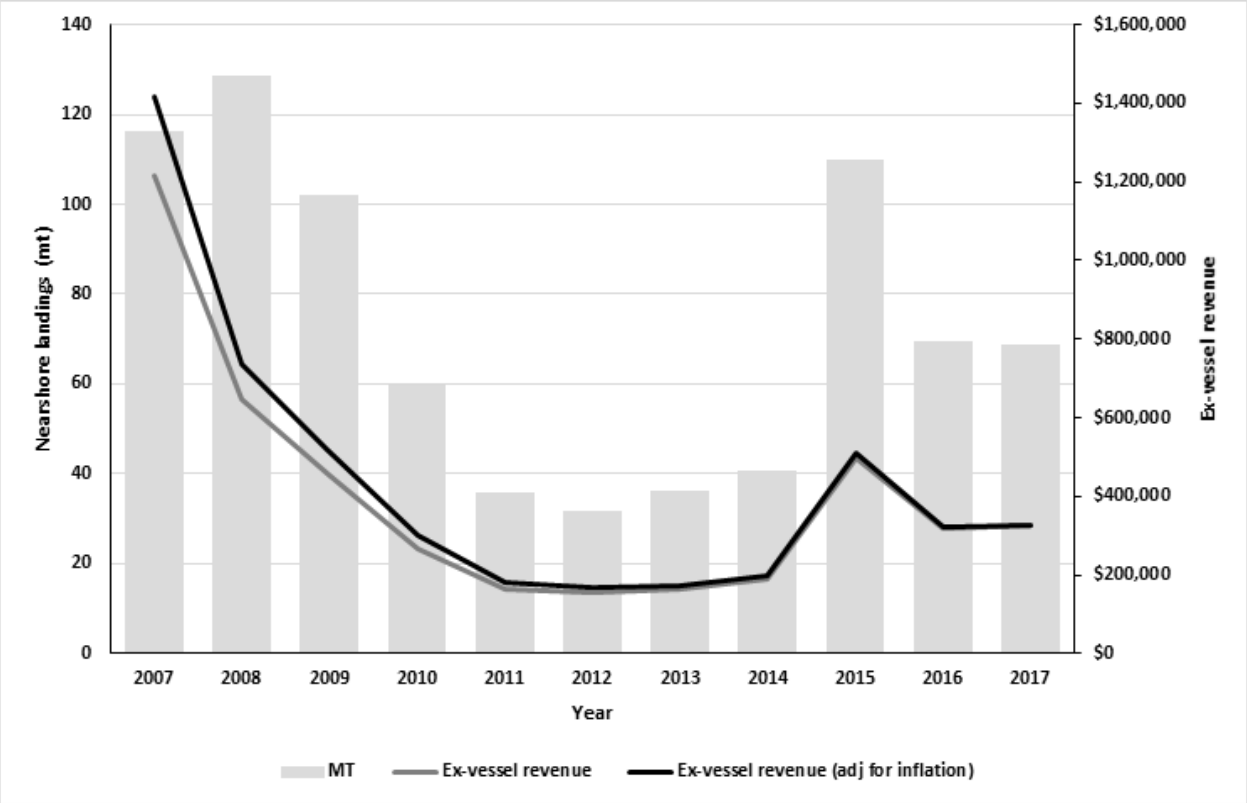

Figure B-40; Data source: PacFIN.

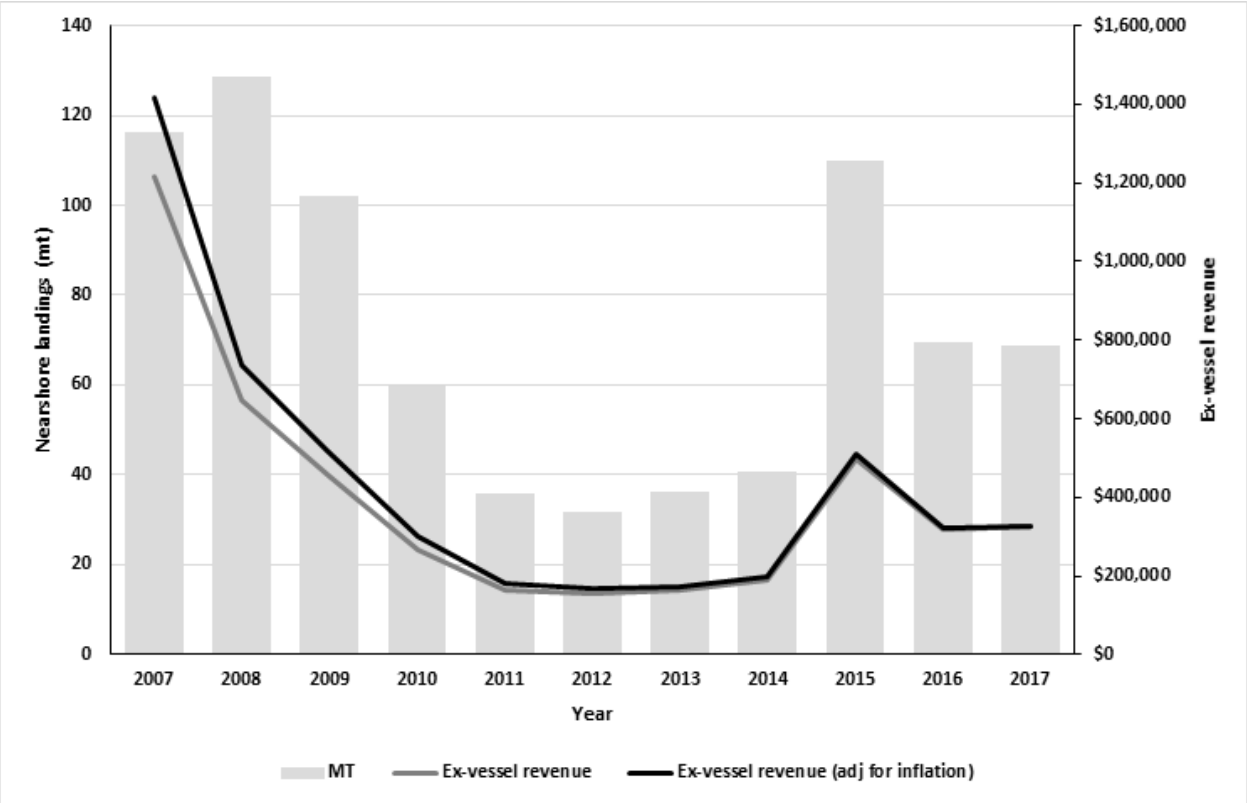

Figure B-40. Losses and gains in the nearshore fishery (includes black, blue, and minor nearshore rockfish) from 2007–17, north of 40° 10' N lat. Data source: PacFIN.

In 2013–14, the yelloweye rockfish nearshore share was split between CA and OR, 27.3 percent and 72.7 percent respectively. The CA nearshore share of yelloweye rockfish in 2013–14 was 0.3 mt of the 1.1 mt for the entire nearshore fishery. Because of the small amount to yelloweye rockfish allocated to the CA nearshore fishery, and the shoreward boundary of non-trawl RCA still in place at 20 fm, the landings and ex-vessel value remained low, about 65–69 percent of landings and 86–88 percent of the revenue generated compared to 2007.

Some relief to the nearshore fishery came in 2015, when the shoreward boundary line of the commercial non-trawl RCA was modified from 20 to 30 fm and year-round retention of lingcod was allowed, all of which helped to reduce pressure on nearshore stocks. The ACL increased by 1 mt to 18 mt in 2015 and 19 mt in 2016. However, the CA nearshore fishery, now comprised of about 16 vessels, was still operating under a share of 0.3 mt of yelloweye rockfish, 0.2 mt for north of 40°10' N lat.

In 2017, the nearshore HG of yelloweye rockfish increased to 2.1 mt, with CA receiving 0.7 mt for 2017 and 0.6 mt in 2018. Additionally in 2017, the FGC adopted changes to transfer provisions (which went into effect in April 2018) for the Deeper Nearshore Fishery Permit[31] (DNSFP) and the Shallow Nearshore

[31] Deeper Nearshore Fishery Permit allows for the commercial take of black, blue, brown, calico, copper, olive, quillback rockfish and treefish with no area restriction.

Fishery Permit[32] (SNFP) for the first time since the initial issuance in 2003. The changes in transfer provisions were the State's effort to provide an opportunity for single permit holders (i.e., a permittee with either a DNSFP or a SNFP) to obtain the other permit which would allow for flexibility in targeting all nearshore species and thus reduce regulatory discarding of nearshore species.

As of early May 2018, 18 permit transfers have occurred. CDFW anticipates more permits transfers and participation to increase as we move through 2018 and into the next few years. As noted in Agenda Item F.2. Attachment 3, April 2018, an increase in effort is expected from the new transfer provisions but the extent is unknown. Due to the uncertainty, no proposals were made to change the California nearshore trip limits. Under the No Action alternative, California's share of yelloweye rockfish could accommodate slight increases in landings due to nearshore permit transfers without exceeding allowable limits. Yet, if cumulative landings are higher than expected, inseason action could be taken to reduce trip limits or even implement a time closure.

As more participants begin entering the fishery, there could be additional effort in deeper depths to target the deeper nearshore rockfish, especially north of 40° 10' N lat. where the year-round trip limits are significantly higher than in the south. As noted in the Agenda Item F.2.a Supplemental GAP Report 1, April 2018, industry is concerned that an influx of several new permits and fishermen in northern California would result in more yelloweye impacts. North of 40°10' N lat., the non-trawl RCA is from 30 fm–100 fm. According to the nearshore model, a 10 percent shift in effort in the north to 30 fm projects the attainment of the California share of yelloweye rockfish under No Action, whereas under Alternative 1 or 2, the fishery would remain well below the yelloweye rockfish share (56-71 percent of share; Table B-20). Since the rural coastal communities of northern CA rely heavily upon fishing as their main economy, taking measures to reduce landings due to insufficient yelloweye rockfish allocations, as would likely occur under No Action, could further impact these communities. However, with the higher allocation of yelloweye rockfish under Alternative 1 (1.3 mt), the nearshore fishery could sustain new entrants and fully attain CA nearshore HGs or modifications to the non-trawl RCA could be considered. Under Alternative 2 (1.6 mt), the nearshore fishery could likely afford to continue to expand its efforts, but also could consider deeper depth restrictions.

Between 40°10' to 34°27' N Latitude

While the impacts to yelloweye rockfish between 40°10' and 34°27' N lat. are less than in north of 40° 10' N lat., fisheries and communities were nonetheless impacted by the reductions in the yelloweye rockfish ACLs and implementation of the non-trawl RCAs. The ports of north central and south central California include Fort Bragg, Bodega Bay, San Francisco, Half Moon Bay, Moss Landing, Monterey, and Morro Bay. Fort Bragg and Moss Landing rank high for social vulnerability and commercial dependency. Monterey and Morro Bay are ranked as moderately socially vulnerable and highly dependent on commercial fisheries (Table B-18).

Because of productive waters and the higher biodiversity, the coastal communities of north and south central California rely on a slightly different suite of fisheries to maintain an economy: squid, Dungeness crab, California halibut, salmon, nearshore rockfish, and sea urchins (Figure B-41). However, much like northern California, if Dungeness crab and salmon are doing poorly or out of season, most of the fishing effort shifts over to groundfish.

[32] Nearshore Fishery Permit allows for the take of black & yellow, China, grass, gopher, and kelp rockfish, cabezon, kelp greenling, and CA scorpionfish in one of four regions: North Coast, North-Central, South-Central, and South Coast.

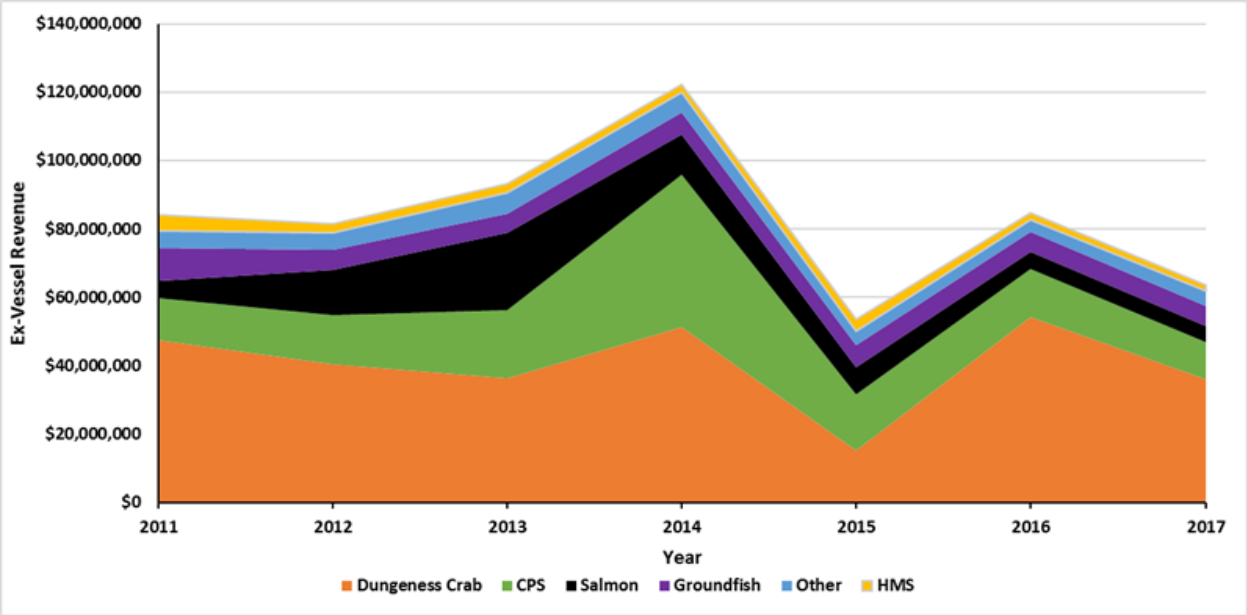

Figure B-41. Ex-vessel revenue, adjusted for inflation, by fishery from ports between 40° 10' and 34° 27' N lat. Other includes invertebrates, skates, rays, halibut, and nearshore non-groundfish finfish. Data source: PacFIN.

Even with the increases in yelloweye rockfish ALCs since the 2011 rebuilding plan, the yelloweye rockfish allocations have continued to be constraining to the non-nearshore and nearshore fisheries between 40°10' to 34°27' N lat. The concerns of impacting yelloweye rockfish have prevented adjustments to the seaward boundary of the non-trawl RCA to deeper depths for California non-nearshore fisheries to access shelf rockfish and lingcod (2011-2012 FEIS), and have prevented the nearshore fishery from achieving full allocation by having to reduce landings to stay within the CA shares of yelloweye rockfish (2015-2016 EIS).

Until recently, adjustments to non-trawl RCAs could not be considered. From updates to the nearshore model (Agenda Item F.2. Attachment 3, April 2018) and the non-trawl RCA adjustment analysis done in the 2017-2018 Analytical Document, Council, through inseason action in June 2017, recommended the shoreward boundary of non-trawl RCA from 40°10' to 34°27' N lat. be moved out to 40 fm from 30 fm to provide more access to the deeper nearshore species and lingcod. Although the nearshore model indicated the impacts to yelloweye rockfish would be within the 2017–18 CA share of yelloweye rockfish of 0.7 mt and 0.6 mt, respectively, the total mortality estimates from WCGOP have yet to be published to corroborate the model's projection. WCGOP provides annual groundfish mortality reports for the previous year in the fall, which means it could take up to 18 months to know the impacts from any changes to a fixed gear fishery. Once the mortality estimates are provided, then the model can be updated and further adjustments can be made to remain within yelloweye rockfish allocations.

The time lag causes apprehension and can cause the delay of modifications to trip limits and RCAs. For example, during the scoping process for the 2019–20 Harvest Specifications, CDFW and the GMT received requests from industry to open the nearshore and lingcod seasons[33] south of 40°10' N lat. to year-round fishing and to increase the nearshore trip limits. Although managers try to meet the needs of the communities by providing year-round fishing opportunities, the unknown impacts to yelloweye rockfish from the recent adjustment to the shoreward non-trawl RCA boundary and the new transfer

[33] Nearshore rockfish, shelf rockfish, lingcod, and CA scorpionfish trip limits are closed in period 2 (March – April).

provisions with the Nearshore Fishery Permits, compelled CDFW and the GMT to deny trip limits requests due to concerns regarding exceeding yelloweye rockfish impacts.

The area between 40°10' to 34°27' N lat. would be able to continue harvesting under No Action and remain within allowable limits; however, Alternative 1 or 2 could allow for a year-round fishery and further modifications to the non-trawl RCA that would provide access to healthy groundfish stocks.

B.5.6.2 California Recreational Communities

According to RecFIN data, 2015–17 annual average recreational bottomfish boat trips have increased about 21 percent relative to 2010–14; salmon angler trips have decreased about 40 percent, and other types of trips have decreased 28 percent over the same period. In the California recreational fishery, under baseline the fishery is operating under season and depth restrictions to reduce yelloweye (i.e., eliminated all-depth fishery in northern management areas and reduced by 10 fm shallower depth in all other Management Areas). Under the No action, the proposed season and depth restrictions range from limited seasons and depths under Baseline, to allowing all-depths in two management areas for November and December under No Action. The No Action alternative provides additional opportunity compared to the baseline, but the amount cannot be quantified (see references amount indirect effects on effort). Under Alternatives 1 and 2, the fishery is proposed to be open year round at all depths in all areas statewide (see Appendix A for description of seasons). The low yelloweye rockfish ACL and associated allocations are the primary constraint to accessing target species to fisheries north of Point Conception. While some yelloweye rockfish are encountered south of Point Conception, they do not generally limit access to target species in this area. North of Point Conception estimated angler trips would increase from 759,622 under No Action to 824,701 under Alternatives 1 and 2. Recreational fishery economic impacts north of Point Conception would increase from $40.1 million to $50.5 million.

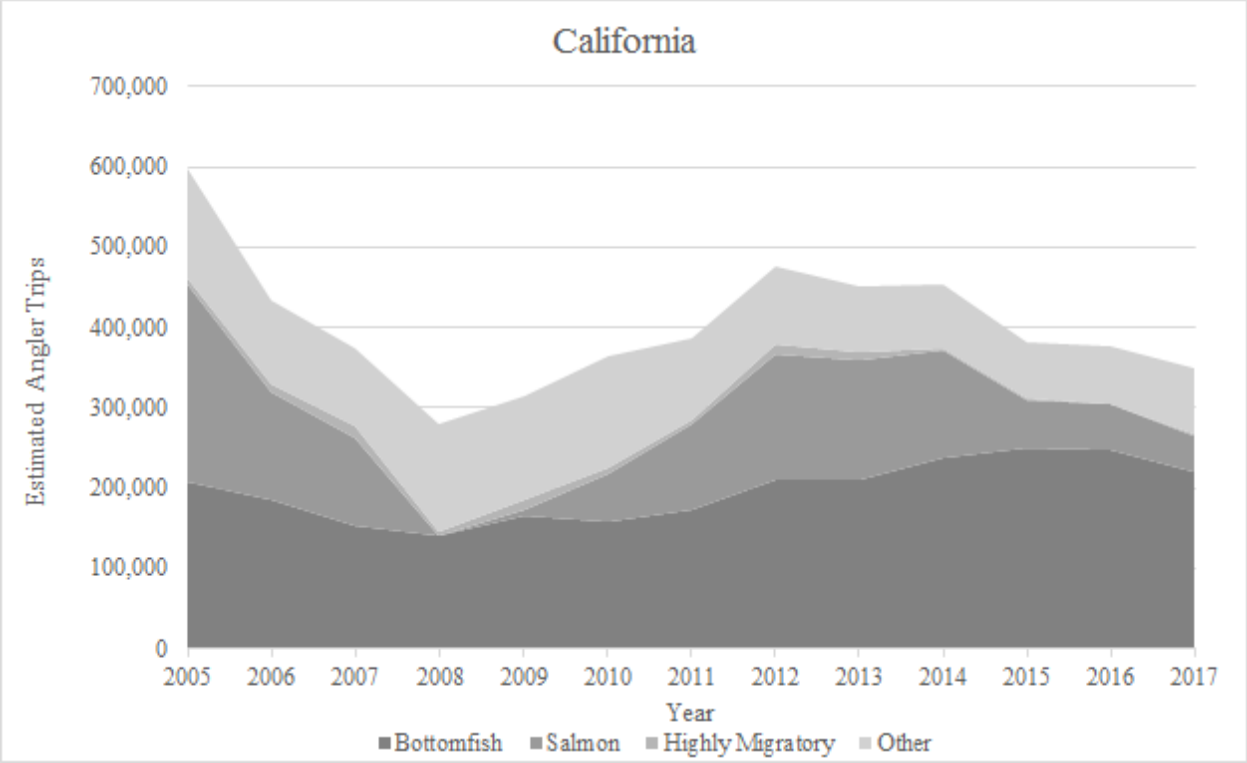

Figure B-42. Number of angler trips from Crescent City south to Morro Bay, 2005 – 2017.

According to RecFIN data, 2015–17 annual average recreational bottomfish boat trips have increased about 21 percent relative to 2010–14; salmon angler trips have decreased about 40 percent, and other types of trips have decreased 28 percent over the same period. In the California recreational fishery, under baseline the fishery is operating under season and depth restrictions to reduce yelloweye (i.e., eliminated all-depth fishery in northern management areas and reduced by 10 fm shallower depth in all other Management Areas). Under the No action, the proposed season and depth restrictions range from limited seasons and depths under Baseline (Table B-21), to allowing all-depths in two management areas for November and December under No Action. The No Action alternative provides additional opportunity compared to the baseline, but the amount cannot be quantified (see references amount indirect effects on effort). Under Alternatives 1 and 2, the fishery is proposed to be open year round at all depths in all areas statewide (see Appendix A for description of seasons). The low yelloweye rockfish ACL and associated allocations are the primary constraint to accessing target species to fisheries north of Point Conception. While some yelloweye rockfish are encountered south of Point Conception, they do not generally limit access to target species in this area. North of Point Conception estimated angler trips would increase from 759,622 under No Action to 824,701 under Alternatives 1 and 2. Recreational fishery economic impacts north of Point Conception would increase from $40.1 million to $50.5 million.

Table B-21. California recreational seasons and depth constraints by management area.

<table>
<tr><th>Management Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td>Northern</td><td colspan="4">Closed</td><td colspan="6">May 1 – Dec 31 <30fm</td><td colspan="2">Oct 16-Dec 31 <20 fm</td></tr>
<tr><td>Mendocino</td><td colspan="4">Closed</td><td colspan="8">May 1 – Dec 31 <20fm</td></tr>
<tr><td>San Francisco</td><td colspan="4">Closed</td><td colspan="6">April 15 – Oct 15 <40fm</td><td colspan="2">Oct 16-Dec 31 <30 fm</td></tr>
<tr><td>Central</td><td colspan="4">Closed</td><td colspan="6">April 1 – Oct 15 <50fm</td><td colspan="2">Oct 16-Dec 31 <40 fm</td></tr>
<tr><td>Southern</td><td colspan="2">Closed</td><td colspan="10">Mar 1 – Dec 31 <60 fm</td></tr>
</table>

Historically, California's recreational groundfish fishery has been constrained given the need to rebuild several stocks (bocaccio south of 40°10' N lat., canary rockfish, yelloweye rockfish) that were declared overfished in the early 2000s. Restrictions included reductions in season length, depth restrictions, and retention allowances. As stocks have rebuilt, restrictions have been removed (i.e., elimination of bocaccio sub-bag limit, limited retention of canary rockfish). Currently, yelloweye rockfish is the only species encountered in the California recreational fishery under a rebuilding plan other than cowcod (which does not constrain the fishery north of Point Conception). Yelloweye rockfish remains the greatest constraint on duration, access, and quality of fishing opportunity in California and reductions in ACLs to facilitate rebuilding have had severe economic consequences on coastal communities (see further discussion under individual management areas).

According to NMFS's report on Fisheries Economics of the United States (2015), California generates the majority of the impacts from expenditures on saltwater recreational fishing in the Pacific Region. In 2015, nearly 16,500 jobs and $2.1 billion in sales impacts were attributed to California. The state of California also generated the biggest income impacts ($797 million) and greatest value added impacts ($1.3 billion). Given the importance of California's saltwater recreational fisheries to the overall economic health of the Pacific Region – providing stability in fishing seasons and/or increased opportunities can have a substantial positive impact on coastal communities.

The socioeconomic implications of ACL alternatives for a particular coastal community varies based in part on a region's vulnerability and dependence on groundfish fisheries and current groundfish fishing opportunities. Recreational ocean salmon fishing opportunities in California vary by year and area and have resulted in limited or no salmon opportunities in some years. Similarly, albacore tuna opportunities have been available sporadically in some ports between July and October, but have been absent in recent years. Groundfish effort may increase in years when alternative opportunities are unavailable and/or insufficient or decrease when other targets offer better opportunities. For 2018, groundfish effort is expected to increase due to severe reductions in recreational salmon opportunities.

While the number of angler trips can be quantified due to changes in season length, there are a number of additional direct and indirect effects of deeper depth restrictions that can drive additional fishing effort, yet can only be addressed qualitatively. Access to deeper depths is expected to increase the fishery participation, though the potential response in terms of increased angler trips cannot be quantified with available data. In addition, the redistribution of fishing effort onto a broader suite of species (e.g., yellowtail rockfish and chilipepper), would reduce the pressure on nearshore stocks and provide additional options to address competing and conflicting management needs (i.e., minimize impacts on black rockfish without increasing encounters with yelloweye rockfish).

Northern Management Area

The Northern Management Area encompasses the ports of Crescent City, Trinidad, Eureka, and Fields Landing which are among the most adversely affected ports in terms of constraints on season and depth restrictions to minimize yelloweye rockfish impacts. The ports of Crescent City and Eureka were identified as having moderate to high social vulnerability and dependence on groundfish in the recreational fisheries by NMFS (Table B-18).

Given the low biodiversity of nearshore rockfish, fishing effort for groundfish species in this region is primarily focused on black rockfish and lingcod. Other opportunities include albacore, Pacific halibut, and California halibut (intermittent) in Humboldt Bay. Recreational salmon opportunities in this region can be limited in some years. From 2008 to 2010, restrictions were implemented to address the collapse of Sacramento River fall Chinook. In the past three years (2015–17), the number of ocean recreational salmon trips in California in 2017 has fallen by nearly 50 percent from 2012–14. Regionally, there were no recreational salmon trips originating in 2017 from Crescent City or Eureka due to the complete closure of the California KMZ. The number of trips was 51 percent lower than last year in Fort Bragg (2016 Salmon SAFE). These two periods coincide with increased groundfish effort and clearly demonstrate the importance of alternative fishing opportunities when salmon fishing is closed (Figure B-43). Alternative opportunities will be particularly important for 2018 and in future years given the likely event of continued restrictions to rebuild the now overfished salmon stocks.

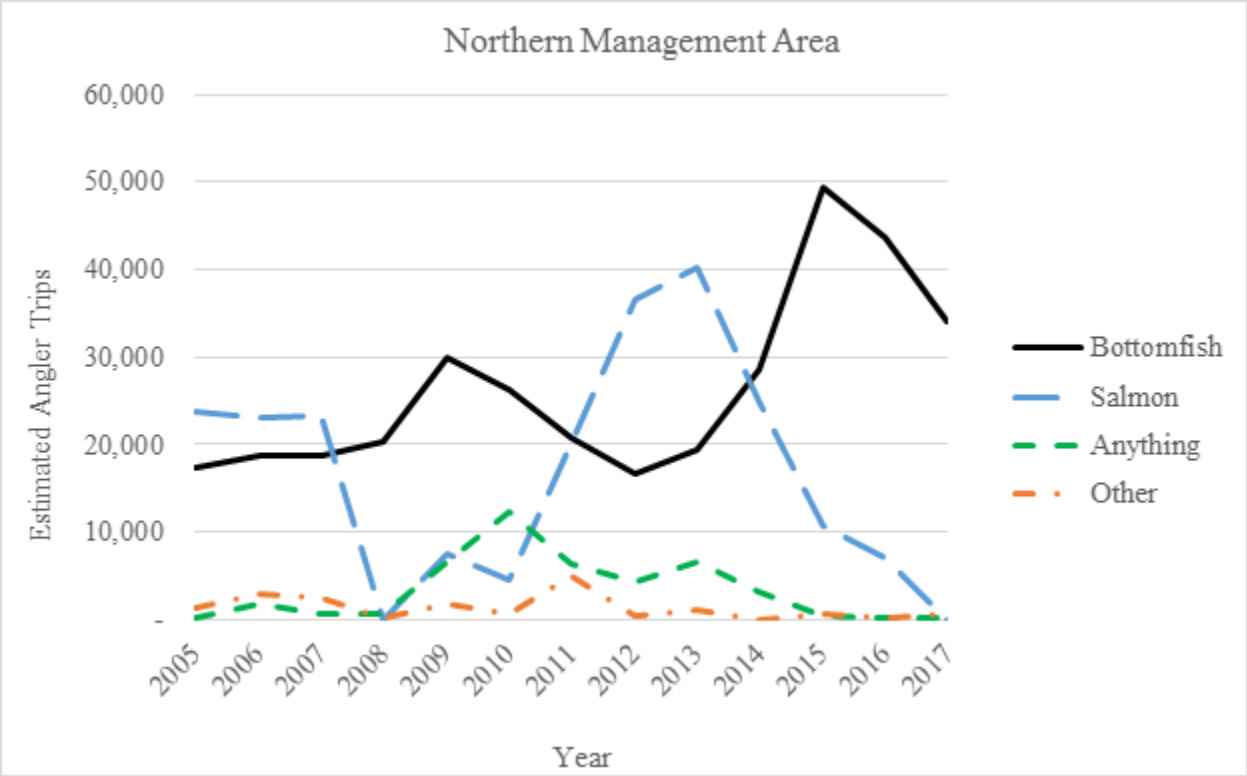

Figure B-43. Recreational angler trips in the Northern Management Area of the California recreational fishery by trip type target from 2005–17 for the private rental and party charter boat modes in ocean waters.

Regulations implemented to reduce encounters of black rockfish have disproportionately affected this area and combined with limited access to other species in deeper depths have likely contributed to the

decline in effort since implementation of restrictive regulations in 2015 (Figure B-43). Resumed access to deeper depths would allow access to shelf rockfish species and displace black rockfish to fill bag limits. This would especially be beneficial for smaller vessels that fish closer to shore due to safety considerations, while allowing anglers with larger vessels to access deeper depths, spreading effort over more species and fishing grounds. If additional yelloweye rockfish been available in 2017, inseason restrictions to reduce yelloweye rockfish encounters may not have been necessary minimizing negative impacts and providing greater stability to these communities. Anecdotal information suggests that CPFV operators experienced a reduction in participation (i.e., canceled booking and/or trips) due to the perception of lost fishing access due to the inseason action.

The groundfish season in the Northern Management Area are some of the most limited along the California Coast under No Action, open from May 1 to December 31st. Depth restrictions for groundfish in this region have been shallower than 30 fm since 2004, with depth restrictions shallower than 20 fm from 2008 until the areas open to fishing were increased to 30 fm in 2017. Fishing effort in this area is highest in the summer months and much of the effort is from out of town visitors, which contributes important revenues to local businesses. While the majority of the fishing effort is exerted during the summer months, which are open to fishing under No Action, 16,400 additional trips are projected under Alternatives 1 and 2, providing an additional $1.8 million in income to coastal communities.

Mendocino Management Area

The Mendocino Management Area encompasses the ports of Shelter Cove, Fort Bragg and Albion. Fort Bragg was identified as having high social vulnerability and dependence on groundfish in the recreational fisheries by NMFS (Table B-2). The fishing community in this area has been heavily impacted by long-term groundfish fishery restrictions implemented to reduce encounters with yelloweye rockfish (Figure B-44). The depth restriction in this area has been the shallowest in the state due to higher yelloweye rockfish encounters; depth restrictions have been shallower than 30 fm since 2001 and was 20 fm in all years except 2006 and 2007 (Figure B-44). In 2007, the depth restriction was liberalized to 30 fm, resulting in a significant increase in yelloweye rockfish encounters which caused the HG to be exceeded. As a result, the entire recreational fishery north of Point Conception was closed two months early to prevent further overages.

Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Days
1999													365
2000													304
2001					20	20					20	20	304
2002					20	20	20	20	20	20			243
2003							20	20	20	20	20		153
2004	30	30						20	20	20			151
2005							20	20	20	20	20	20	184
2006							30	30	30	30	30	30	184
2007						30	30	30	30				122
2008						20	20	20					92
2009					20	20	20	20					91
2010					20	20	20	20					91
2011					20	20	20	20					91
2012					20	20	20	20					91
2013					20	20	20	20	20				108
2014					20	20	20	20	20				109
2015					20	20	20	20	20	20			168
2016					20	20	20	20	20	20			168
2017					20	20	20	20	20	20	20	20	245

Figure B-44. California recreational groundfish season and depth restrictions from 1999 to 2017 in the Mendocino Management Area. Blank cells represent no restrictions on season or depth. Shaded cells represent fishery closures. Values in cells represent depth restriction in fm.

The Mendocino Management Area experiences similar issues relative to implications of management measures implemented for black rockfish as the Northern Management Area, although the degree of impact is somewhat lessened given there is a greater diversity of nearshore rockfish in this area. Under No Action, the fishery will continue to have a limited season (seven months) with depth restrictions (20 fm May-Oct., all-depths Nov-Dec.). The higher amounts of yelloweye rockfish available under Alternatives 1 and 2 could allow for increased fishing opportunities and provide greater stability to the community by minimizing disruptions to the fishery that results in reduced revenue for coastal communities. Had additional yelloweye rockfish been available in 2017, inseason restrictions to reduce yelloweye rockfish encounters may not have been necessary minimizing negative impacts to these communities.

The groundfish season in the Mendocino Management Area are some of the most limited along the California Coast under No Action, open from May 1 to December 31. However, groundfish effort has increased in recent years in this area (Figure B-45), likely due to small increases to the length of the groundfish season and effort shifts from the salmon fishery which has been affected by more severe restrictions in recent years. Few other fishing opportunities in the area are available given the overfished status of Sacramento River fall Chinook and Klamath River fall Chinook in 2018, and the relative absence of albacore in recent years. Remaining opportunities for Pacific halibut and groundfish are likely to be the only available fishing opportunity, increasing the dependence of fishing communities in this area on groundfish stocks.

Fishing effort in this area is highest in the summer months and much of the effort is from out of town visitors, which brings important revenue to local businesses. While the majority of the fishing effort is exerted during the summer months, which are open to fishing under No Action, 7,200 additional trips are expected under Alternatives 1 and 2, providing an additional $1.1 million in additional income.

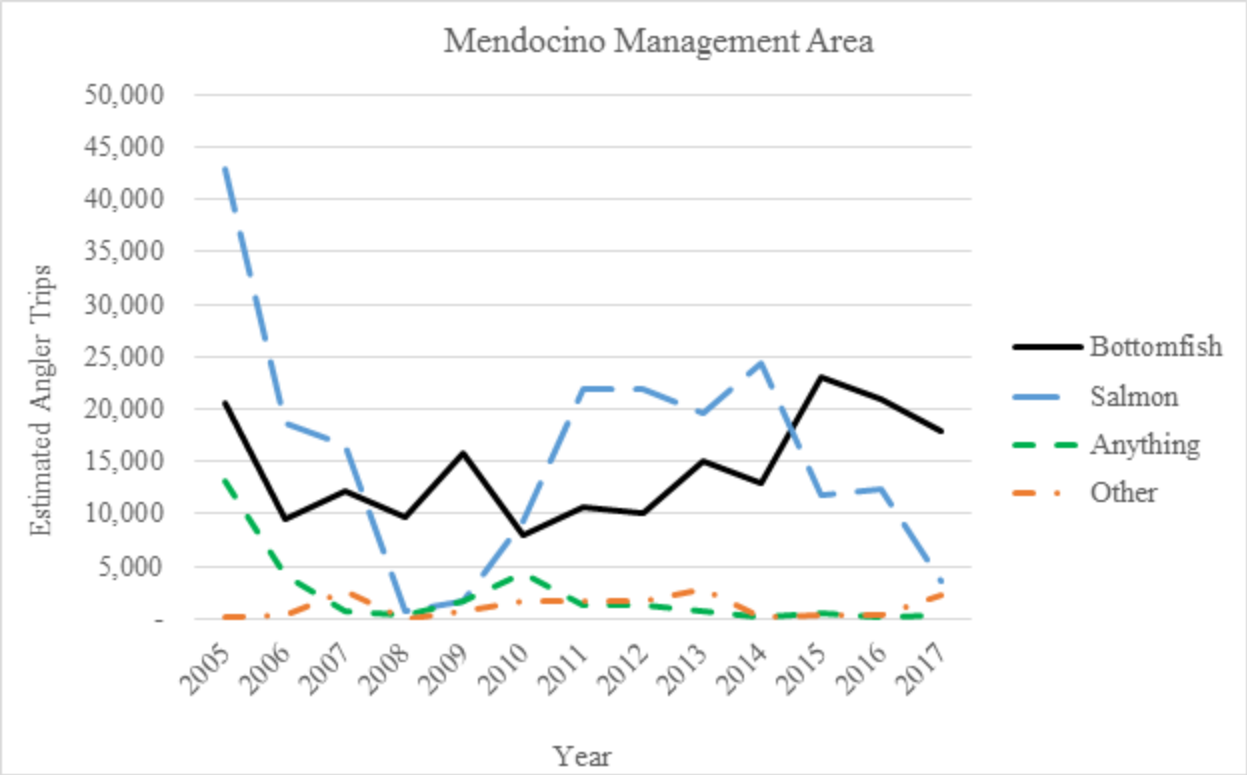

Figure B-45. Recreational angler trips in the Mendocino Management Area of the California recreational fishery by trip type target from 2005–17 for the private rental and party charter boat modes in ocean waters.

San Francisco Management Area

The San Francisco Management Area encompasses the ports of Bodega Bay, Anchor Bay, Sausalito, Berkeley, Emeryville, San Francisco and Princeton as well as a number of minor ports. Half Moon Bay was identified as having low social vulnerability and moderate dependence on groundfish in the recreational fisheries by NMFS (Table B-18). This region has been subject to depth restrictions since 2001 when a 20 fm depth restriction went into place, with access to 30 fm since 2006 and 40 fm since 2017. Yelloweye rockfish are less commonly encountered in this management area than to the north, allowing access to deeper depths and slightly longer seasons (April 15 - Dec 31) under No Action. This area is home to the largest coastal population in northern California and a far greater amount of effort is exerted there than to the north (Figure B-46). While encounter rates are lower in this region, the high effort results in a significant contribution to statewide yelloweye rockfish mortality.

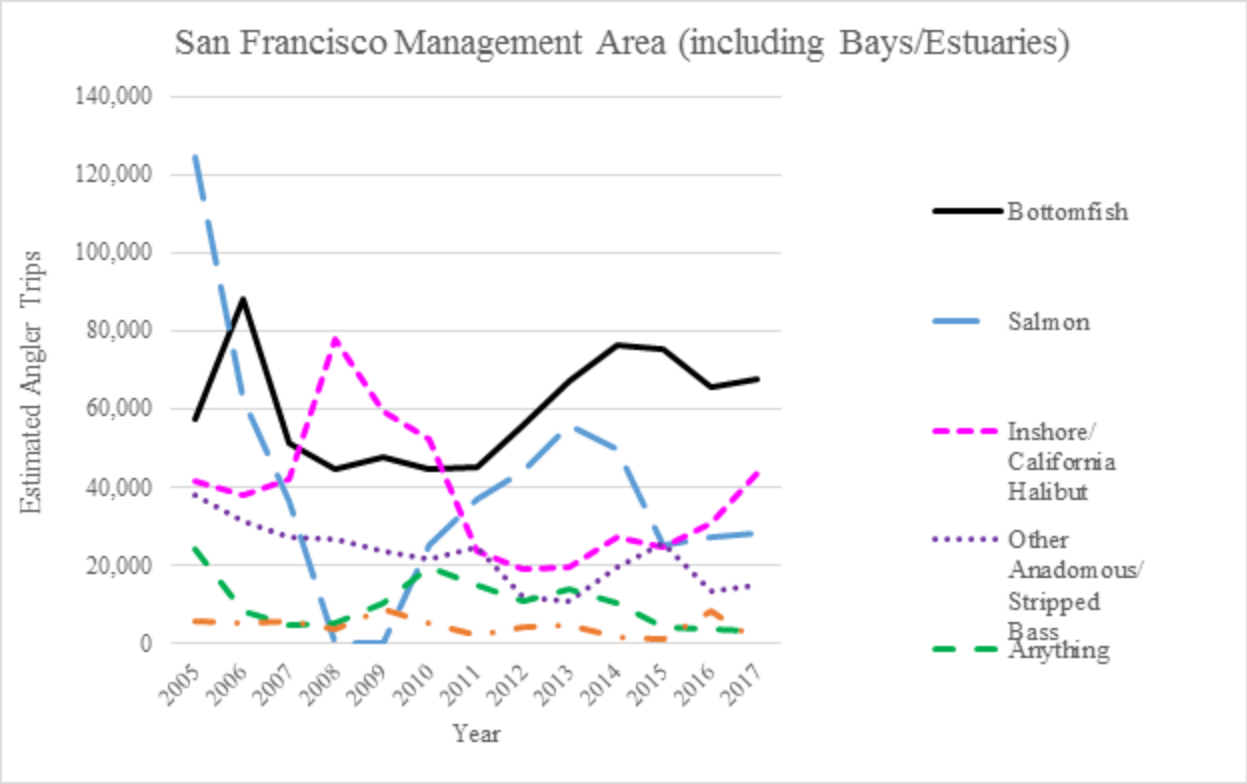

Figure B-46. Recreational angler trips in the San Francisco Management Area of the California recreational fishery by trip type target from 2005–17 for the private rental and party charter boat modes in ocean and inland waters.

Fishing effort for groundfish has increased in recent years until 2015 which coincided with the implementation of the restrictive regulations on the black rockfish bag limit (Figure B-46). This increase is concomitant with the decline in fishing effort for salmon as low abundance and restrictions due to the declines in abundance of Sacramento River winter Chinook as well as Sacramento River fall Chinook. Albacore opportunities are infrequent and transient, requiring long trips as the continental shelf is further offshore in the Gulf of the Farallones. Unlike other management areas, the San Francisco Bay offers unique fishing opportunities for California halibut and striped bass, which provides an alternative when other fisheries are closed or when weather is inclement. The quality of fishing opportunity for these alternative targets fluctuates, though it has been increasing in recent years as has fishing effort. Groundfish has historically been relied upon as a stable fishing opportunity given the seasonality and variability in availability of other targets. The increased fishing opportunities under Alternative 1 and 2 would provide increased stability of fishing opportunity in the San Francisco Management Area.

The San Francisco Management Area accounts for a high proportion of the statewide black rockfish impacts and regulations implemented to reduce black rockfish mortality have had significant impacts similar to the Northern and Mendocino Management Areas. This area is also confounded by the conflicting need to keep depth restrictions shallow to minimize yelloweye rockfish encounters while there is an impetus to push effort into deeper waters to minimize black rockfish encounters.

Depth restrictions were implemented from 30 to 40 fm in 2017 in part to decrease impacts on black rockfish by spreading effort over a larger area and number of species. Several Marine Protected Areas which prohibit fishing are found in this area which concentrate fishing effort in the shallow areas

available under the current depth restrictions. Under No Action, the fishery will continue to be constrained by limited season (7.5 months) and depth restrictions (40 fm Apr–Dec). The higher HGs under Alternative 1 and 2 would allow access to deeper depths and redistribute fishing effort away from nearshore waters and over more fishing grounds and species. Had additional yelloweye rockfish been available in 2017, inseason restrictions to reduce yelloweye rockfish encounters may not have been necessary minimizing negative impacts to these communities.

The groundfish season in the San Francisco Management Area under No Action is open from April 15 to December 31st. Fishing effort in this area is highest in the summer months, though this major metropolitan area generates substantial fishing effort year round if opportunity is provided. While the majority of the fishing effort is exerted during the summer months, which are open to fishing under No Action, 217,400 additional trips are expected under Alternatives 1 and 2, providing an additional $3.7 million in income. Similar to other management areas, the higher ACL alternatives provide a buffer against the potential need for inseason action and reduce the likelihood of disruptions to the fishery that result in reduced revenue for coastal communities.

Central Management Area

The Central Management Area encompasses the ports of Santa Cruz, Capitola, Moss Landing, Monterey, Morro Bay and Avila. The ports of Moss Landing and Monterey were identified by NMFS as having moderate to high and medium social vulnerability, respectively and both having high dependence on groundfish in the recreational fisheries (Table B-18). Yelloweye rockfish encounter rates are generally lower in this area than to the north allowing for deeper depth restrictions (40 fm from 2001–16; 50 fm in 2017) and longer seasons than to the north. Though black rockfish comprise a lower proportion of the groundfish catch in this area, access to deeper depths (under Alternative 1 and 2) is expected to further redistribute effort from the nearshore species onto healthy shelf rockfish stocks (i.e., yellowtail and chilipepper rockfish). Had additional yelloweye rockfish been available in 2017, inseason restrictions to reduce yelloweye rockfish encounters may not have been necessary minimizing negative impacts to these communities.

Fishing effort for groundfish in this management area has remained relatively stable in recent years while salmon effort has declined due to restrictions put in place to limit catch of Sacramento winter run Chinook salmon (Figure B-47). Albacore tuna can provide intermittent seasonal fishing opportunity from July to October in some years, though they have not been available recently. Sporadic opportunity for white seabass can occur and is usually associated with the presence of squid. California halibut and sanddabs also provides a marginal fishing opportunity in the nearshore waters. In the absence of these seasonal and unpredictable fishing opportunities, groundfish provide the only reliable opportunity that is sufficiently productive to drive fishing effort, making the coastal communities in this region dependent on groundfish for the stability of the recreational fishery.

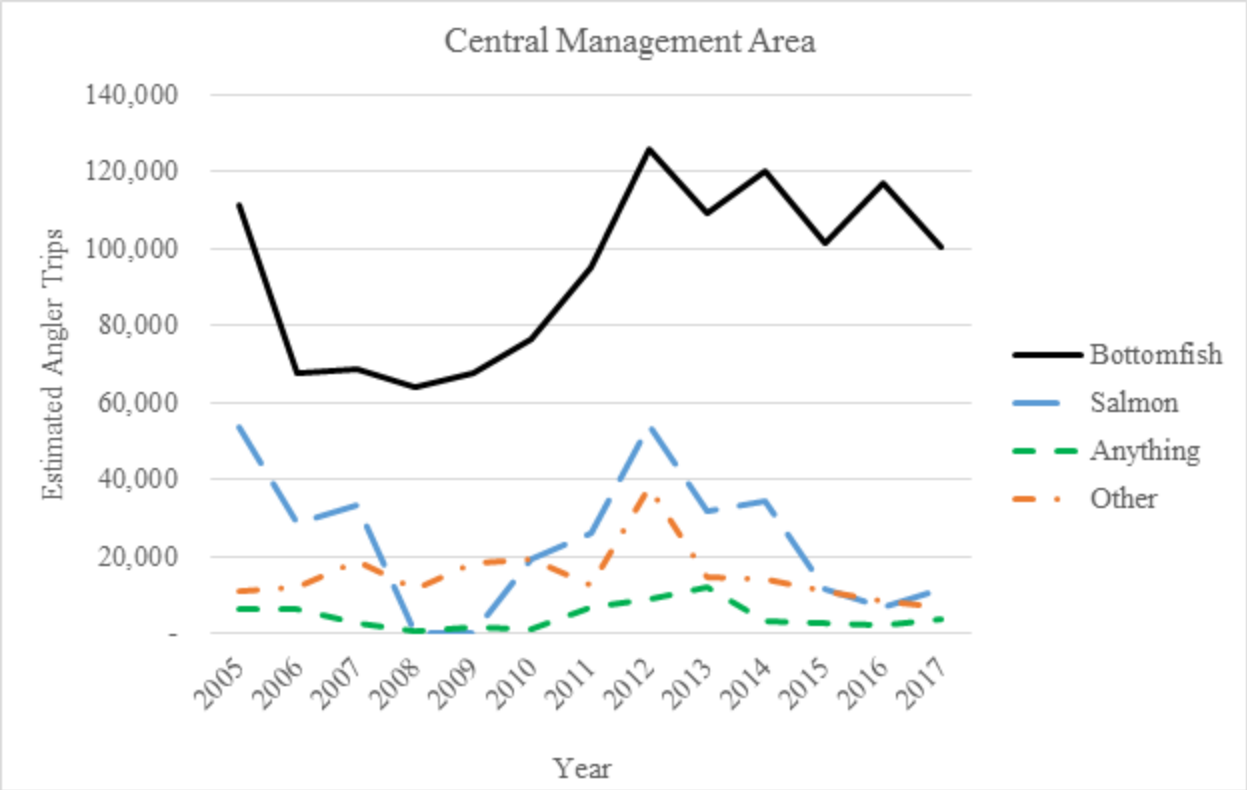

Figure B-47. Recreational angler trips in the Central Management Area of the California recreational fishery by trip type target from 2005–17 for the private rental and party charter boat modes in ocean waters.

The groundfish season in the Central Management Area is open from April 1 to December 31 under No Action. While the majority of the fishing effort is exerted during the summer months, which are open to fishing No Action, 24,200 additional trips are expected under Alternatives 1 and 2, providing an additional $3.8 million in income. Similar to other management areas, the higher ACL alternatives provide a buffer against the potential need for inseason action and reduce the likelihood of disruptions to the fishery resulting in reduced revenue for coastal communities.

B.6 Data Used

In compiling this report, analysts relied on the most recently available data, largely recreational trip information from RecFIN and commercial landings data from PacFIN, both complete through 2017. Mortality estimates from WCGOP are available through 2016. Where practicable and informative, more recent partial data are incorporated as available from January–May 5, 2018 from PacFIN and the IFQ Vessel Account page.

Appendix 1. History of management measures by sector, designed to limit or reduce impacts to yelloweye rockfish, 2002–17.

Year	Sector	Management Measure/Restrictions
2002	Recreational	Retention prohibited
	Commercial	Bi-monthly retention trip limits
	Trawl	Rockfish conservation area implemented
	Non-trawl	Rockfish conservation area implemented
2003	Recreational	Seasonal depth restrictions implemented, vary by state
	WA Rec	C-shaped area off of northern WA closed to groundfish fishing (North Coast Recreational YRCA)
	WA Rec	L-shaped YRCA 49° N to 48°18' N lat.
	Trawl	Gear restrictions to reduce trawling in rocky shelf habitats
2004	OR Rec	Restrictions on groundfish retention during all-depth Pacific halibut openings
2005	N. CAL, WA, OR FG	Lingcod rebuilds and could support much higher landings, but trip limits and catch stay low in order to reduce bycatch of yelloweye rockfish
2007	WA Rec	South Coast YRCA implemented
	OR Rec	Stonewall Bank YRCA implemented
	CA Rec	North of Pigeon Point closed Oct. 1
	Fixed Gear	North Coast WA commercial YRCA implemented
	Salmon Troll	Salmon Troll YRCA implemented
	Trawl	seasonal changes to trawl RCA boundaries and periodic closures within certain boundaries (e.g., north of Cape Alava at 48°10' N lat. to US/Can border)
2009	WA Rec	Westport Offshore Recreational YRCA implemented
	CA Rec/ Fixed Gear	Point St. George YRCA put into regulation and available for implementation inseason
	CA Rec/ Fixed Gear	South Reef YRCA put into regulation and available for implementation inseason
	CA Rec/ Fixed Gear	Reading Rock YRCA put into regulation and available for implementation inseason

Year	Sector	Management Measure/Restrictions
	CA Rec/ Fixed Gear	Point Delgada YRCA put into regulation and available for implementation inseason
2010	OR Rec	Seasonal depth restriction changed inseason to 20 fm July 24- Dec 31
2011	OR Rec	Seasonal depth restriction changed inseason to 20 fm July 21- Sep 30
2012	WA Rec	Closed in the north coast management area (marine areas 3 and 4) after Labor Day
2012	OR Rec	Seasonal depth restriction modified to 30 fm in state rule
2016	OR Rec	Seasonal depth restriction changed inseason to 20 fm July 15- Sept. 30
2017	OR Rec	Descending devices mandatory for any vessel fishing for or retaining groundfish or halibut and must be used to release all rockfish outside of 30 fm

Appendix 2. Limited entry trawl RCA depth boundaries by year and month, 2002–17, including inseason changes.

Year	Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2017	North of 45°46'	100 – 150											
	45° 46' - 40°10'	100 - m200 [a/]											
	South of 40°10'	100 – 150											
2016	North of 48°10'	0 - m200 [a/]		0 - 200		0 – 150				0 - 200		0 - m200 [a/]	
	48°10' - 45°46'	100 – 150											
	45°46' - 40°10'	100 - m200											
	South of 40° 10'	100 – 150											
2015	North of 48°10'	0 - m200		0 - 200		0 – 150				0 - 200		0 - m200 [a/]	
	48°10' - 45°46'	100 – 150											
	45°46' - 40°10'	100 - m200											
	South of 40° 10'	100 – 150											
2014a	North of 48°10'	0 - m200		0 - 200		0 – 150				0 - 200		0 - m200 [a/]	
	48°10' - 45°46'	100 – 150											
	45°46' - 40°10'	100 - m200 [a/]											
	40°10' - 34°27'	100 – 150											
	South 34° 27' (mainland)												
	South 34°27' (islands)	0 – 150											
2013a	North of 48°10'	0 - m200 [a/]		0 - 200		0 – 150				0 - 200		0 - m200 [a/]	
	48°10' - 45°46'	75 - m200 [a/]		75 - 150		100 – 150						75 - 150	
	45°46' - 40°10'			75 - 200		100 – 200						75 - m200 [a/]	
	40°10' - 34°27'	100 – 150											
	South 34°27' (mainland)												
	South 34°27' (islands)	0 – 150											
2012a	North of 48°10'	0 - m200 [a/]		0 - 200		0 – 150				0 - 200		0 - m200 [a/]	

<table>
<tr><th>Year</th><th>Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td rowspan="5"></td><td>48°10' - 45°46'</td><td colspan="2" rowspan="2">75 - m200 [a/]</td><td colspan="2">75 - 150</td><td colspan="8">100 – 150</td><td colspan="2">75 - 150</td></tr>
<tr><td>45°46' - 40°10'</td><td colspan="2">75 - 200</td><td colspan="8">100 – 200</td><td colspan="2">75 - m200 [a/]</td></tr>
<tr><td>40°10' - 34°27'</td><td colspan="12" rowspan="2">100 – 150</td></tr>
<tr><td>South 34°27' (mainland)</td></tr>
<tr><td>South 34°27' (islands)</td><td colspan="12">0 – 150</td></tr>
<tr><td rowspan="6">2011a</td><td>North of 48°10'</td><td colspan="2">0 - m200 [a/]</td><td colspan="2">0 - 200</td><td colspan="6">0 – 150</td><td colspan="2">0 - 200</td><td colspan="2">0 - m200 [a/]</td></tr>
<tr><td>48°10' - 45°46'</td><td colspan="2" rowspan="2">75 - m200 [a/]</td><td colspan="2" rowspan="2">75 - 200</td><td colspan="2">75 - 150</td><td colspan="4">100 – 150</td><td colspan="4">75 - 150</td></tr>
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<tr><td>40°10' - 34°27'</td><td colspan="12" rowspan="2">100 – 150</td></tr>
<tr><td>South 34°27' (mainland)</td></tr>
<tr><td>South 34°27' (islands)</td><td colspan="12">0 – 150</td></tr>
<tr><td rowspan="6">2010a</td><td>North of 48°10'</td><td colspan="2">0 - m200 [a/]</td><td colspan="2">0 - 200</td><td colspan="6">0 – 150</td><td colspan="2">0 - 200</td><td>0 - m200 [a/]</td><td>0 - 250</td></tr>
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<tr><td>South 34°27' (mainland)</td></tr>
<tr><td>South 34°27' (islands)</td><td colspan="12">0 – 150</td></tr>
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<tr><td>45°46' - 40°10'</td><td colspan="2">75 - 200</td><td colspan="4">100 – 200</td></tr>
<tr><td>40°10' - 34°27'</td><td colspan="12">100 – 150</td></tr>
</table>

<table>
<tr><th>Year</th><th>Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td rowspan="2"></td><td>South 34°27' (mainland)</td><td colspan="12"></td></tr>
<tr><td>South 34°27' (islands)</td><td colspan="12">0 – 150</td></tr>
<tr><td rowspan="11">2008a</td><td>North of 48°10'</td><td colspan="2">0 - m200 [a/]</td><td colspan="2">0 - 200</td><td colspan="6">0 – 150</td><td colspan="2">0 - m200</td></tr>
<tr><td>48°10’ - 46°38.17’</td><td colspan="2" rowspan="4">75 - m200 [a/]</td><td colspan="2">60 - 200</td><td colspan="4">60 – 150</td><td colspan="2" rowspan="2">75 - 150</td><td colspan="2" rowspan="4">75 - m200 [a/]</td></tr>
<tr><td>46°38.17’ - 46°16’</td><td colspan="2">60 - 200</td><td colspan="3">60 - 150</td></tr>
<tr><td>46°16’ - 45°46</td><td colspan="2">75 - 200</td><td colspan="3">75 – 150</td><td colspan="2">75 - 200</td></tr>
<tr><td>45°46’ - 43°20.83’</td><td colspan="4">75 – 200</td></tr>
<tr><td>43°20.83’ - 42°40.50’</td><td colspan="2">0 - m200 [a/]</td><td colspan="4">0 – 200</td><td colspan="4">0 - m200 [a/]</td></tr>
<tr><td>42°40.5’ - 40°10’</td><td colspan="2">75 - m200 [a/]</td><td colspan="2">75 - 200</td><td colspan="4">60 – 200</td><td colspan="2">75 - 200</td><td colspan="2">75 - m200 [a/]</td></tr>
<tr><td>40°10’ - 34° 27’</td><td colspan="12" rowspan="2">100 – 150</td></tr>
<tr><td>South 34°27’ (mainland)</td></tr>
<tr><td>South 34°27’ (islands)</td><td colspan="12">0 – 150</td></tr>
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<tr><td>40°10' - 38'</td><td colspan="2">100 - m200 [a/]</td><td colspan="6">100 – 150</td><td colspan="2">100 - m200 [a/]</td></tr>
<tr><td>38° - 34°27'</td><td colspan="12" rowspan="2">100 – 150</td></tr>
<tr><td>South 34°27' (mainland)</td></tr>
</table>

<table>
<tr><th>Year</th><th>Area</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td></td><td>South 34°27’ (islands)</td><td colspan="12">0 – 150</td></tr>
<tr><td rowspan="5">2006a</td><td>North 40°10’</td><td colspan="2">75 - m200 [a/]</td><td colspan="4">75 - 200</td><td colspan="2">100 – 250</td><td colspan="2">75 - 250</td><td colspan="2" rowspan="2">75 - m250 [a/]</td></tr>
<tr><td>40°10 - 38°</td><td colspan="2" rowspan="3">75 - 150</td><td colspan="4" rowspan="3">100 - 150</td><td colspan="2">100 – 200</td><td colspan="2">100 - 250</td></tr>
<tr><td>38° - 34°27’</td><td colspan="6" rowspan="2">100 - 150</td><td colspan="2" rowspan="2">75 - 150</td></tr>
<tr><td>South 34°27’ (mainland)</td></tr>
<tr><td>South 34°27’ (islands)</td><td colspan="12">0 – 150</td></tr>
<tr><td rowspan="5">2005a</td><td>North 40°10’</td><td colspan="2">75 - m200 [a/]</td><td colspan="8">100 – 200</td><td colspan="2" rowspan="2">0 - 250</td></tr>
<tr><td>40°10’ - 38°</td><td colspan="2" rowspan="3">75 - 150</td><td colspan="2">100 - 200</td><td colspan="6">100 – 150</td></tr>
<tr><td>38° - 36°</td><td colspan="8" rowspan="3">100 – 150</td><td colspan="2">0 - 200</td></tr>
<tr><td>36° - 34°27’</td><td colspan="2" rowspan="2">50 - 200</td></tr>
<tr><td>South 34°27’ (mainland)</td></tr>
<tr><td>South 34°27’ (islands)</td><td colspan="8">0 – 150</td><td colspan="2">0 - 200</td></tr>
<tr><td rowspan="5">2004</td><td>North 40°10’</td><td colspan="2">75 - m200 [a/]</td><td colspan="2">60 - 200</td><td colspan="2">60 - 150</td><td colspan="4">75 - 150</td><td colspan="2" rowspan="2">0 - 250</td></tr>
<tr><td>40°10’ - 38°</td><td colspan="4" rowspan="3">75 - 150z</td><td colspan="4" rowspan="3">100 - 150z</td><td rowspan="3">75 - 150z</td></tr>
<tr><td>38° - 36°</td><td colspan="2">0 - 200</td></tr>
<tr><td>36° - 34°27’</td><td colspan="2" rowspan="2">0 - 150</td></tr>
<tr><td>South 34°27’ (mainland)</td></tr>
<tr><td>South 34°27’ (islands)</td><td colspan="12">0 – 150</td></tr>
<tr><td rowspan="3">2003</td><td>North 40°10’</td><td colspan="2">100 - m250 [a/]</td><td colspan="2">100 - 250</td><td colspan="2">50 - 200</td><td colspan="2">75 – 200</td><td colspan="2">50 - 200</td><td colspan="2" rowspan="3">0 - m200 [a/]</td></tr>
<tr><td>40°10’ - 38°</td><td colspan="2">50 - m250 [a/]</td><td colspan="2">60 - 250</td><td colspan="6" rowspan="2">60 - 200</td></tr>
<tr><td>38° - 34°27’</td><td colspan="2">50 - 150</td><td colspan="2">60 - 150</td></tr>
</table>

Year	Area	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	South 34°27’ (mainland)	100 - 150				100 – 200							
	South 34°27’ (islands)	0 - 150				0 – 200							
2002	North 40°10’	Within DBCA - CLOSED TO TRAWLING, September - December, special footrope requirements outside DBCA											

a/ The "modified" depth" line is modified to exclude certain petrale sole areas from the RCA.

Appendix 3. Fixed gear RCA depth boundaries by year and month, 2002–17, including inseason changes.

Year	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2017	North 46°16’	shore - 100 fm											
	42° - 46°16’	30 - 100 fm											
	40°10’ - 42°												
	34°27’ - 40°10’	40 125 fm											
	South 34°27’	75 fm - 150 fm line (also applies around islands)											
2016	North 46°16’	shore - 100 fm											
	42° - 46°16’	30 - 100 fm											
	40°10’ - 42°												
	34°27’ - 40°10’	30 fm - 150 fm line											
	South 34°27’	60 fm - 150 fm line (also applies around islands)											
2015	North 46°16’	shore - 100 fm											
	42° - 46°16’	30 - 100 fm											
	40°10’ - 42°												
	34°27’ - 40°10’	30 fm - 150 fm line											
	South 34°27’	60 fm - 150 fm line (also applies around islands)											
2014	North 46°16’	shore - 100 fm											
	43° - 46°16’	30 - 100 fm											
	42° - 43°												
	40°10 - 42°	20 fm depth contour - 100 fm											
	34°27’ - 40°10’	30 fm - 150 fm line											
	South 34°27’ (+ islands)	60 fm - 150 fm line (also applies around islands)											
2013	North 46°16’	shore - 100 fm											
	43° - 46°16’	30 - 100 fm											
	42° - 43°												

Year	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	40°10’ - 42°	20 fm depth contour - 100 fm											
	34°27 - 40°10’	30 fm - 150 fm line											
	South 34°27’ (+ islands)	60 fm - 150 fm line (also applies around islands)											
2012	North 46°16’	shore - 100 fm											
	43° - 46°16’	30 - 100 fm											
	42° - 43°	20 - 100 fm											
	40°10’ - 42°	20 fm depth contour - 100 fm											
	34°27’ - 40°10’	30 fm - 150 fm line											
	South 34°27’ (+ islands)	60 fm - 150 fm line (also applies around islands)											
2011	North 46°16’	shore - 100 fm											
	45°03.83’ – 46°16’	30 - 100 fm											
	43° - 45°03.83’	30 - 125 fm (125 line reduced to 100 fm during directed halibut days)											
	42° - 43°	20 - 100 fm											
	40°10’ - 42°	20 fm depth contour - 100 fm											
	34°27’ - 40°10’	30 fm - 150 fm line											
	South 34°27’ (+ islands)	60 fm - 150 fm line											
2010	North 46°16’	shore - 100 fm											
	45°03.83’ - 46 16’	30 - 100 fm											
	43° - 45°03.83’	30 - 125 fm (125 line reduced to 100 fm during directed halibut days)											
	42° - 43°	20 - 100 fm											
	40°10’ - 42°	20 fm depth contour - 100 fm											
	34°27’ - 40°10’	30 fm - 150 fm line											
	South 34°27’ (+ islands)	60 fm - 150 fm line											

Year	Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2009	North 46°16’	shore - 100 fm											
	45°03.83’ - 46°16’	30 - 100 fm											
	43° - 45°03.83’	30 - 125 fm (125 line reduced to 100 fm during directed halibut days)											
	42° - 43°	20 - 100 fm											
	40°10’ - 42°	20 fm depth contour - 100 fm											
	34°27’ - 40°10’	30 - 150 fm											
	South 34°27’ (+ islands)	60 fm - 150 fm											
2008	North 46°16’	shore - 100 fm											
	40°10’ - 46 16’	30 - 100 fm											
	34°27’ - 40°10’	30 - 150 fm											
	South 34°27’ (+ islands)	60 fm - 150 fm											
2007	North 46°16’	shore - 100 fm											
	40°10’ - 46°16’	30 - 100 fm											
	34°27’ - 40°10’	30 - 150 fm											
	South 34°27’ (+ islands)	60 fm - 150 fm											
2006	North 46°16’	shore - 100 fm											
	40°10’ - 46°16’	30 - 100 fm											
	34°27’ - 40°10’	30 - 150 fm				20 - 150 fm				30 - 150 fm			
	South 34°27’ (+ islands)	60 fm - 150 fm											
2005	North 46°16’	shore - 100 fm											
	40°10’ - 46°16’	30 - 100 fm											
	34°27’ - 40°10’	30 - 150 fm				20 - 150 fm				30 - 150 fm			
	South 34°27’ (+ islands)	60 fm - 150 fm											

<table>
<tr><th>Year</th><th>Location</th><th>Jan</th><th>Feb</th><th>Mar</th><th>Apr</th><th>May</th><th>Jun</th><th>Jul</th><th>Aug</th><th>Sep</th><th>Oct</th><th>Nov</th><th>Dec</th></tr>
<tr><td rowspan="4">2004</td><td>North 46°16’</td><td colspan="12">shore - 100 fm</td></tr>
<tr><td>40°10’ - 46°16’</td><td colspan="12">30 - 100 fm</td></tr>
<tr><td>34°27’ - 40°10’ (+ islands)</td><td colspan="4">30 - 150 fm</td><td colspan="4">20 - 150 fm</td><td colspan="4">30 - 150 fm</td></tr>
<tr><td>South 34°27’ (+ islands)</td><td colspan="12">60 fm - 150 fm</td></tr>
<tr><td rowspan="4">2003</td><td>North 46°16’</td><td colspan="11">shore - 100 fm</td><td>shore - 200 fm</td></tr>
<tr><td>40°10’ - 46 °16’</td><td colspan="11">27 - 100 fm</td><td rowspan="3">shore - 150 fm</td></tr>
<tr><td>34°27’ - 40°10’</td><td colspan="11">20 - 150 fm</td></tr>
<tr><td>South 34°27’ (+ islands)</td><td colspan="8">20 - 150 fm</td><td colspan="3">30 - 150 fm</td></tr>
<tr><td>2002</td><td>South 40°10’</td><td colspan="5">20 – 150 fm</td><td colspan="7">CLOSED > 20fm (exceptions: sablefish, S Thorny and slope RF)</td></tr>
</table>

Note: Flatfish can be taken within the non-trawl RCA with a #2 hook or smaller, and no more than 12 hooks per line

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